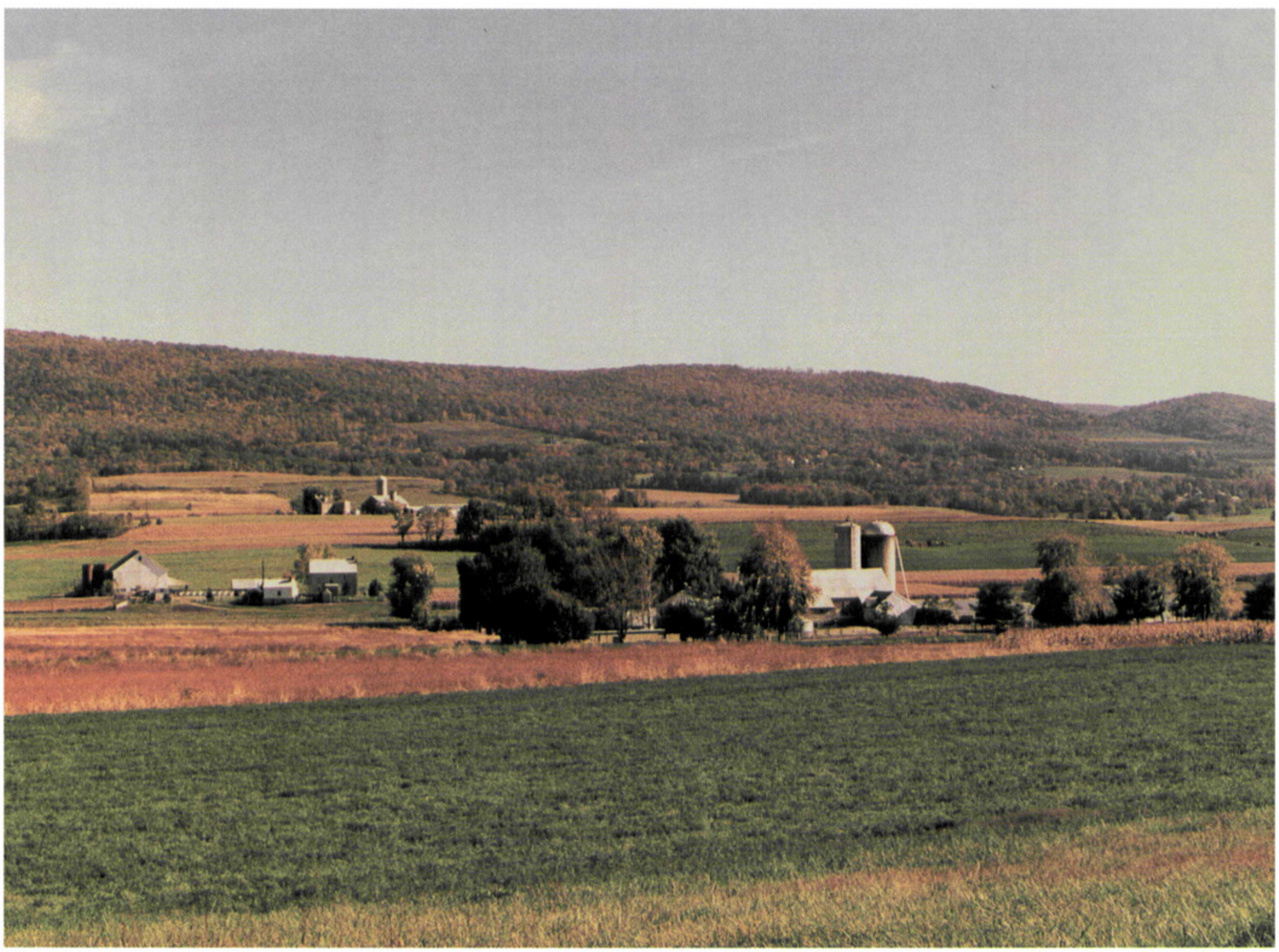
United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with
Board of County
Commissioners of
Washington County,
Maryland; Washington
County Soil Conservation
District; Maryland
Agricultural Experiment
Station (University of
Maryland, College Park)

Soil Survey of Washington County, Maryland



How to Use This Soil Survey

General Soil Map

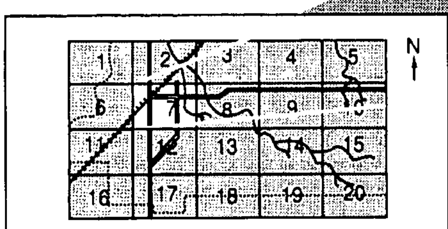
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

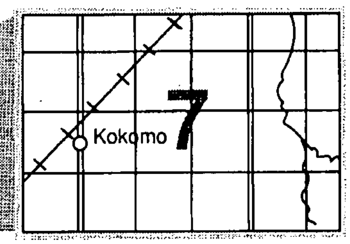
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet and turn to that sheet.

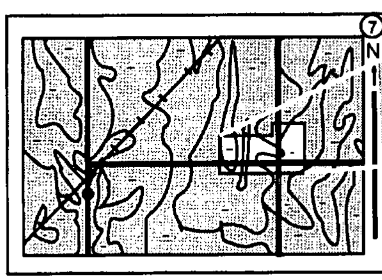


INDEX TO MAP SHEETS



MAP SHEET

Locate your area of interest on the map sheet. Note the map units symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



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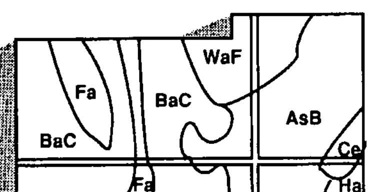

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1996. Soil names and descriptions were approved in 1998. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1996. This survey was made cooperatively by the Natural Resources Conservation Service and the Board of County Commissioners of Washington County, Maryland; the Washington County Soil Conservation District; and the Maryland Agricultural Experiment Station (University of Maryland).

The survey is part of the technical assistance furnished to the Washington County Soil Conservation District.

Cover: Farming in an area of Ryder-Duffield channery silt loams. Dekalb-Bagtown-Rock outcrop complex is on South Mountain in the background.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service homepage on the World Wide Web. The address is http://www.nrcs.usda.gov.

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Issued 2003

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Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

David P. Doss
State Conservationist
Natural Resources Conservation Service

Soil Survey of
Washington County, Maryland

By Joseph S. Kraft,
Natural Resources Conservation Service

Fieldwork by Phillip S. King, Joseph S. Kraft, and Carl E. Robinette,
Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
Board of County Commissioners of Washington County, Maryland;
Washington County Soil Conservation District; and
Maryland Agricultural Experiment Station (University of Maryland)

WASHINGTON COUNTY is bordered by Mason and Dixon's line and Pennsylvania to the north and by the far shore of the Potomac River, Virginia, and West Virginia to the south (fig. 1). It extends eastward to South Mountain and Frederick County and westward to Sideling Hill Creek and Allegany County. In most of western Maryland, relatively few miles separate Pennsylvania and West Virginia. The county has a land area of about 455 square miles, or 295,000 acres. Hagerstown, the county seat, is 70 miles from Washington, DC, 72 miles from Baltimore, Maryland, 156 miles from Pittsburgh, Pennsylvania, and 176 miles from Richmond, Virginia.

This soil survey supersedes the soil survey of Washington County published in 1962 (USDA, SCS, 1962). It provides additional information and has larger maps, which show the soils in greater detail. The soil maps are available as a digital spatial database that can be used in a Geographic Information System, or GIS.

General Nature of the County

This section describes the history and development; industry and transportation; physiography and relief; water supply; agriculture; natural resources; and climate of Washington County.

History and Development

The original settlers of the area now known as Washington County came mostly from other colonies and were mostly of English, Scotch, or Swiss descent. Some settlers were from Alsace and other parts of northeastern France. Later, immigrants of German, Dutch, and Scotch-Irish descent arrived in the area. In 1735, some farms were established in the area (USDA, SCS, 1962).

When established, Frederick County comprised all western Maryland. In September 1776, Washington County was established from Frederick County. In 1789, Allegany County was established from Washington County. In 1800, the county was comparatively well settled, and Hagerstown and Williamsport were commercial centers. Many mills had been built along Conococheague and Antietam Creeks.

The population of Washington County was 103,829 in 1970, 113,086 in 1980, and 121,393 in 1990. In 1990 the population of Hagerstown was 35,445 (Hagerstown-Washington County Economic Development Commission, 1996). The population of the county was estimated to be 130,500 in 2000.

Industry and Transportation

Interstates, such as I-70 and I-81, interconnect some points within Washington County. The county

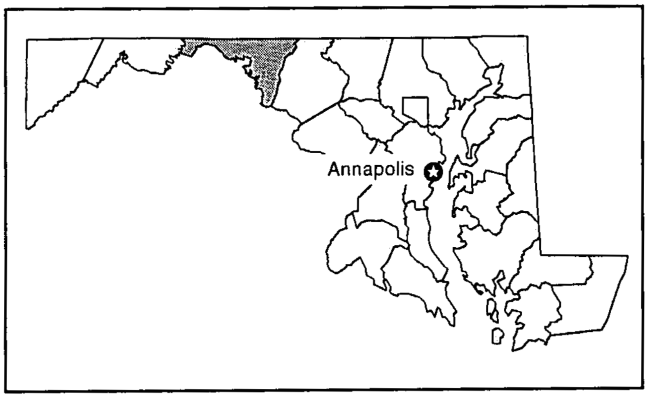

Figure 1.—The location of Washington County in Maryland.

has a good network of State and county paved roads.

More than 30 common carrier motor freight lines provide truck service. Conrail, CSX, and Norfolk and Southern Corporation provide rail transportation. Washington County Regional Airport provides scheduled passenger, freight, and charter services to both Baltimore-Washington International Airport and Greater Pittsburgh International Airport.

Most employment in the county is in agriculture, financial services, government, manufacturing, publishing, transportation, and warehousing (Hagerstown-Washington County Economic Development Commission, 1996).

Physiography and Relief

David Brezinski, Ph.D., sedimentary geologist, Maryland Department of Natural Resources, Maryland Geologic Survey, helped to prepare this section.

The rocks of Washington County occur within two physiographic provinces. At the eastern border of the county, South Mountain is part of the Blue Ridge Physiographic Province (fig. 2). The Hagerstown Valley and numerous ridges and valleys west of Clear Spring lie within the Ridge and Valley Physiographic Province.

Rocks of the Blue Ridge Province are some of the oldest known in Maryland and indeed in the entire Appalachian Mountain chain. The oldest rocks are as much as 1.1 billion years old. The rocks that underlie South Mountain along the eastern border of Washington County are about 540 million years old. They belong to the Weverton Formation, which consists of sandstone that has been put under such intense pressure that individual sand grains have been welded together. Because of this welded texture, rocks of the Weverton Formation are resistant to weathering and erosion; South Mountain is a prominent ridge on this formation. Quirauk Mountain on the Weverton Formation has the highest elevation in the county, 2,145 feet. Dekalb soils formed on the Weverton Formation, and Bagtown soils formed in colluvium derived from rocks of the Weverton Formation. Near the base of South Mountain are phyllite rocks of the Harper's Formation.

The soils formed on the Harper's Formation are Weverton, Hazel, and Talladega soils, and, where the colluvium is very deep, Bagtown soils. Along the western base of South Mountain is the South Mountain fault, where rocks of the Blue Ridge Province and of South Mountain overlie limestone of the Hagerstown Valley.

On Elk Ridge the relationship of geology and soils is similar to that on South Mountain.

The valley between Elk Ridge and South Mountain is underlain by rocks of the Gneiss Complex and Catoctin Formation, which are Precambrian and late Precambrian in age (fig. 3). Locally, these green, metabasaltic rocks are known as greenstone. Catoctin, Highfield, Lantz, Myersville, Mt. Zion, Ravenrock, and Rohrersville soils formed on these rocks. These soils generally have good natural fertility and may be sandy in some places because of the characteristics of the bedrock. Springs are common in this area where the valley floor and Elk Ridge meet.

The Hagerstown Valley takes in more than half the county. It ranges in elevation from about 300 feet near the Potomac River to about 700 feet at the Pennsylvania line. The valley is underlain primarily with Cambrian- and Ordovician-aged strata that range between 530 to 440 million years old. Most of the valley is underlain by limestone and, to a lesser extent, dolomite. Both of these are carbonate rocks that are susceptible to dissolution from ground water, resulting in the formation of caverns. Caverns that reach the surface are called sinkholes. Duffield, Hagerstown, Nollville, Opequon, Ryder, and Swanpond soils formed on these rocks. They are some of the most productive soils in the county. However, limestone outcrops impede some agricultural operations, and sinkholes pose a great threat to water quality. Younger shale and sandstone of the Martinsburg Formation lie in a band along both the east and west sides of the Conococheague Creek. Berks, Brinkerton, Clearbrook, and Weikert soils formed on the Martinsburg Formation. Generally, these soils have low natural fertility, and the shale bedrock is at a depth of less than 40 inches.

From Fairview Mountain westward to Sideling Hill Creek, Ordovician through Mississippian age strata form numerous ridges and intervening valleys. Bear Pond Mountain at 2,000 feet, Fairview Mountain at

Figure 2.—Hard, resistant quartzite caps South Mountain, a prominent ridge that has many rock outcrops. The Dekalb-Bagtown-Rock outcrop complex, 25 to 65 percent slopes, is on South Mountain.

1,700 feet, and Sideling Hill at 1,600 feet are in this region. These ridges are underlain by sandstone of the Tuscarora Formation, Oriskany Sandstone, the Purslane Formation, and other formations. Buchanan, Dekalb, Hazleton, and Sideling soils formed on these formations. In the valleys Berks, Calvin, Clearbrook, Klinesville, and Weikert soils are underlain by shale and Nollville, Pecktonville, and Wurno soils are underlain by limestone.

The ridges along the Potomac River are truncated. Cobbles and boulders that are remnants of an old river terrace and that were deposited during earlier stages of river development are well away from the current riverbed. Downsville, Monongahela, and Tyler soils formed on this old river terrace.

Water Supply

Tim Lung, Washington County Planning Commission, and Dave Shinder, City of Hagerstown Water Department, helped to prepare this section.

Washington County is entirely within the Potomac River Basin, which empties into the Chesapeake Bay Watershed. Some streams flow generally south and empty into the Potomac River. They are Antietam Creek, Little Antietam Creek, Beaver Creek, Marsh Run, Downy Branch, Lanes Run, Conococheague Creek, Licking Creek, Tonoloway Creek, Little Tonoloway Creek, and Sideling Hill Creek. Most of these streams provide potentially good habitat for trout, and all of them provide good opportunities for recreation. Their main sources of recharge are about 39 inches of precipitation and spring discharge, especially in the limestone regions. Surface reservoirs, wells, springs, and the Potomac River supply potable water for various cities and towns and individual landowners (fig. 4). Some 80,000 residents of Hagerstown and the surrounding towns and villages receive all their water supply, about 11 million gallons per day, from the Potomac River. The city and surrounding towns also rely on Edgemont Reservoir as a backup source of water. The reservoir when upgraded will be capable of providing up to about 4.8 million gallons per day. About 65 to 70 percent of the population of the county, some 85,000 to 90,000 individuals, uses a municipal water supply. Individual wells supply the rest of the water service throughout the county. Of these wells the failure rate, because of *E. coli* contamination, is about 8 to 10 percent. These failures are mostly in the limestone regions where sinkholes and underground streams are common. They also occur along the contact of the limestone and shale geologic formations, which parallel the Conococheague Creek. The average depth and production of wells vary depending on the geologic formation in which they are dug.

Agriculture

Don Schwartz, Agricultural Extension Agent, University of Maryland Cooperative Extension Service, helped to prepare this section.

Many of the county's soils, such as Combs, Downsville, Duffield, Funkstown, Lindside, Hagerstown, Murrill, Myersville, and Nollville soils, are well suited to intensive agricultural production. They support the dairy industry, grain production, and on a small but increasing acreage, vegetable production. Shallower soils, such as Berks, Calvin, Catoctin, Klinesville, Opequon, Ryder, Talladega, Weikert, and Wurno soils, are better suited to hay or pasture.

Orchard crops are most prevalent in the Smithsburg area on the foot slopes of South Mountain and on low ridges of the Beaver Creek Fault. A few small orchards are near Hancock. The soils in these areas are Bagtown, Nollville, Ryder, Thurmont, Weverton, and Wurno soils. Generally, air drainage is good from the ridges of South Mountain to the valley floor.

Soil erosion from both water and wind is a common concern. As hedgerows and wood lots are removed, buffers against wind and water have been greatly reduced. Fall plowing is not recommended because wind and water erosion are hazards on bare soil. Conservation tillage, such as reduced till or no-till, and a winter cover crop help to control erosion. Stripcropping, diversions, and waterways help to reduce runoff and to break up slopes. Stripcropping is changing the vegetative cover from corn, small grain, hay, and soybeans. Diversions break up long slopes and divert runoff from fields to a grassed waterway or to an outlet.

Contour stripcropping is not practical on soils that have rocks on the surface or that have rock outcrops. Such soils include Hagerstown, Duffield, and Opequon soils. Although contour strips are impractical to establish on rock ledges, they are feasible on Braddock, Murrill, Myersville, Nollville, and Wurno soils. Erosion control practices reduce runoff and sedimentation, increase organic matter content, improve infiltration, conserve soil moisture, and reduce fuel costs.

Organic matter is important in improving soil tilth and water infiltration. Generally, in Washington County organic matter content in the surface layer is 2 to 4 percent. In some severely eroded areas, on steep slopes, and near rock outcrops, the organic matter content is less than 1 percent. In recent years, as small grain stubble is removed and as corn stubble is

Figure 3.—A typical area of Catoctin-Myersville channery loams on a rolling landscape. Elk Ridge is in the background.

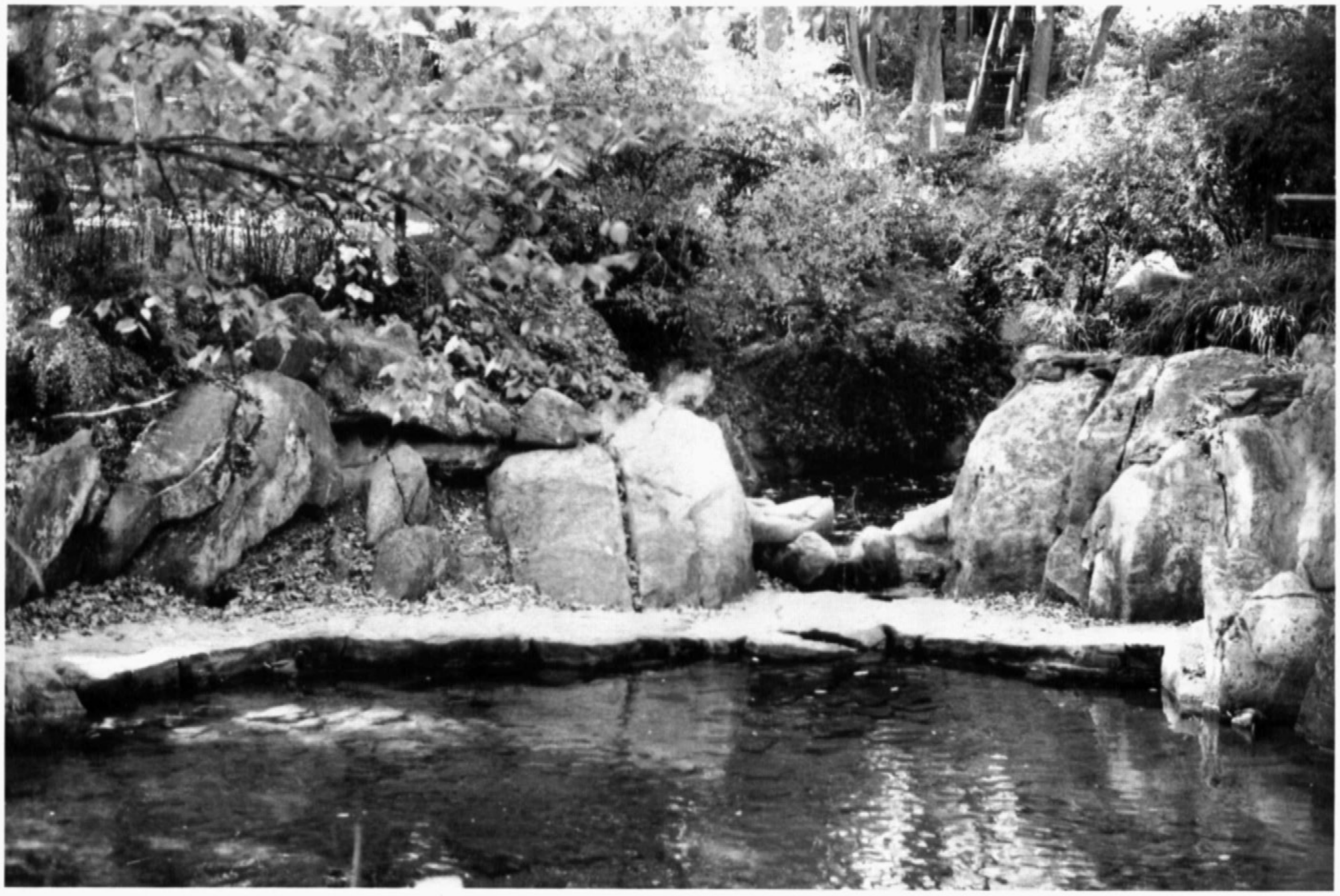

Figure 4.—Springs are common in the karst limestone of Hagerstown Valley. This spring in Hagerstown City Park is one of the larger springs in Washington County.

used for feed, the organic matter content of the soil is reduced. Winter cover crops, green manure, better management and utilization of manure, and conservation tillage or no-till help to increase the organic matter content of the soil. Good organic matter content will increase seed germination, will reduce surface compaction, will increase available soil moisture, and, if manure is used properly, will lower fertilizer costs.

The following is a summary of the 1992 agricultural census data for the county. It includes crops, acreages, livestock, and trends in farming.

Crops

Corn, the primary crop in the county, is harvested for both feed grain and silage (fig. 5). Soybeans are the second largest harvested crop. Although small grains take in more acreage than soybeans, many acres of small grains are harvested as silage and some acres are used as pasture. Traditional forage crops, such as alfalfa, clover, and grasses, have increased in acreage. Although tree fruit crops have declined in acreage in the last decade, Washington County leads the State in acreage of fruit trees. Bagtown, Duffield, Hagerstown, Murrill, Nollville, Ryder, and Thurmont soils are well suited to orchards. A total of 72,406 acres of cropland was harvested, not including 31,273 acres of all pastureland. See Table 1 for acreages of principal crops grown in 1992.

Livestock

Dairying, the primary production enterprise, comprises 198 licensed farms and 16,522 dairy cows. Milk provides about two-thirds of the county's "farm gate" receipts, or nearly $40 million. There are 5,988 beef cows on 269 farms. Including dairy heifers and steers, cattle in the county total 41,875. Seven farms have large swine or poultry operations. The number of smaller swine or poultry operations has decreased, but the numbers have increased for horses, sheep, goats, and such exotic livestock as llama, buffalo, and emu. See table 2 for livestock on farms in 1992.

Types and Sizes of Farms

According to the 1992 Agricultural Census, 123,932 acres, or 42 percent of the county, was farmland. The

Figure 5.—Typical area of Hagerstown silt loam, 3 to 8 percent slopes. This soil is well suited to crops.

average size of the 809 farms in the county was 153 acres. Cropland used for grain and forage crops took in 92,991 acres. Recent census data show that the trend is a decrease in the county's farmland base of about 2,500 acres per year.

The county has 298 farms of 50 to 179 acres, 208 farms of 10 to 49 acres, and 65 farms of 1 to 9 acres. Among the larger farms in the county, 201 farms have 180 to 499 acres, 30 farms have 500 to 999 acres, and 7 farms have more than 1,000 acres. As the number of farms has decreased at a rate of almost 20 per year for the past decade, the trend has been an increase in the percentage of smaller farms. These smaller farms are generally nondairy livestock operations, or they produce fruits, vegetables, and specialty crops. The average age of farm operators has increased gradually, from 50 to 51 during 1987 to 1992.

Natural Resources

John Fry, Curator, Western Maryland Room, Washington County Public Library, and various holdings, helped to prepare this section.

Limestone, the most abundant mineral resource of the county, is both mined and processed. The large limestone quarries throughout the county are associated with the Beekmantown and the St. Paul Groups. The Beekmantown Group consists of the following members: Pinesburg Station Dolomite, Rockdale Run Formation, Stonehenge Limestone, and Conococheague Limestone. The St. Paul Group consists of New Market Limestone and Row Park Limestone. The Beekmantown Group and the St. Paul Group contain relatively pure members that in some places exceed 90 percent $CaCO_3$. Some quarries are associated with the Ellbrook, Tomstown, and Wells Creek Formations. However, these formations contain more impurities, such as shale, siltstone, and mudstone. Products developed from limestone operations are agricultural lime, stone for construction uses, concrete aggregate, and building stone.

Marl material was mined from 1940 through the 1960's for its high $CaCO_3$ content. It is as much as 99 percent pure. Most of the marl pits where located along Marsh Run, near Lappans, Spielman, and St. James. This material was used as agricultural lime.

Martinsburg shale extends in a band along the Conococheague Creek (fig. 6). It is used extensively for brick production and construction materials. The relatively pure Oriskany Sandstone was once made into glass. Weverton Quartzite and Antietam Quartzite was mined and blocked as building materials.

Iron ore mining was extensive from about 1760 to 1900. Most larger mines were located at the base of South Mountain and along Antietam Creek. Some smaller mines were located near Bear Pond Mountain and Hearthstone Mountain. Iron ore was used to make Civil War ordnance, railroad rails, and structural steel.

Climate

Prepared by the Natural Resources Conservation Service, Water and Climate Center, Portland, Oregon.

The tables were created from the climate station at Hagerstown, Maryland.

The data on thunderstorm days, relative humidity, percent sunshine, and wind information are estimated from the First Order Climate Station, Harrisburg, Pennsylvania.

Average wind speed is highest, 9.6 miles per hour, in March.

Table 3 gives data on temperature and precipitation for the survey area as recorded at Hagerstown, Maryland, in the period 1961 to 1990. Table 4 shows probable dates of the first freeze in fall and the last freeze in spring. Table 5 provides data on length of the growing season.

In winter, the average temperature is 32 degrees F and the average daily minimum temperature is 24 degrees. The lowest temperature on record, which occurred on January 17, 1977, is -17 degrees. In summer, the average temperature is 73 degrees and the average daily maximum temperature is 85 degrees. The highest recorded temperature, which occurred on July 16, 1988, is 104 degrees.

Growing degree days are shown in table 3. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 39 inches. Of this, 18 inches, or 45 percent, usually falls in May through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 2 inches. The heaviest 1-day rainfall during the period of record was 7 inches on September 19, 1991. Thunderstorms occur on about 32 days each year, and most occur in July.

The average seasonal snowfall is about 27 inches. The greatest snow depth at any one time during the period of record was 26 inches. On the average, 24 days of the year have at least 1 inch of snow on the

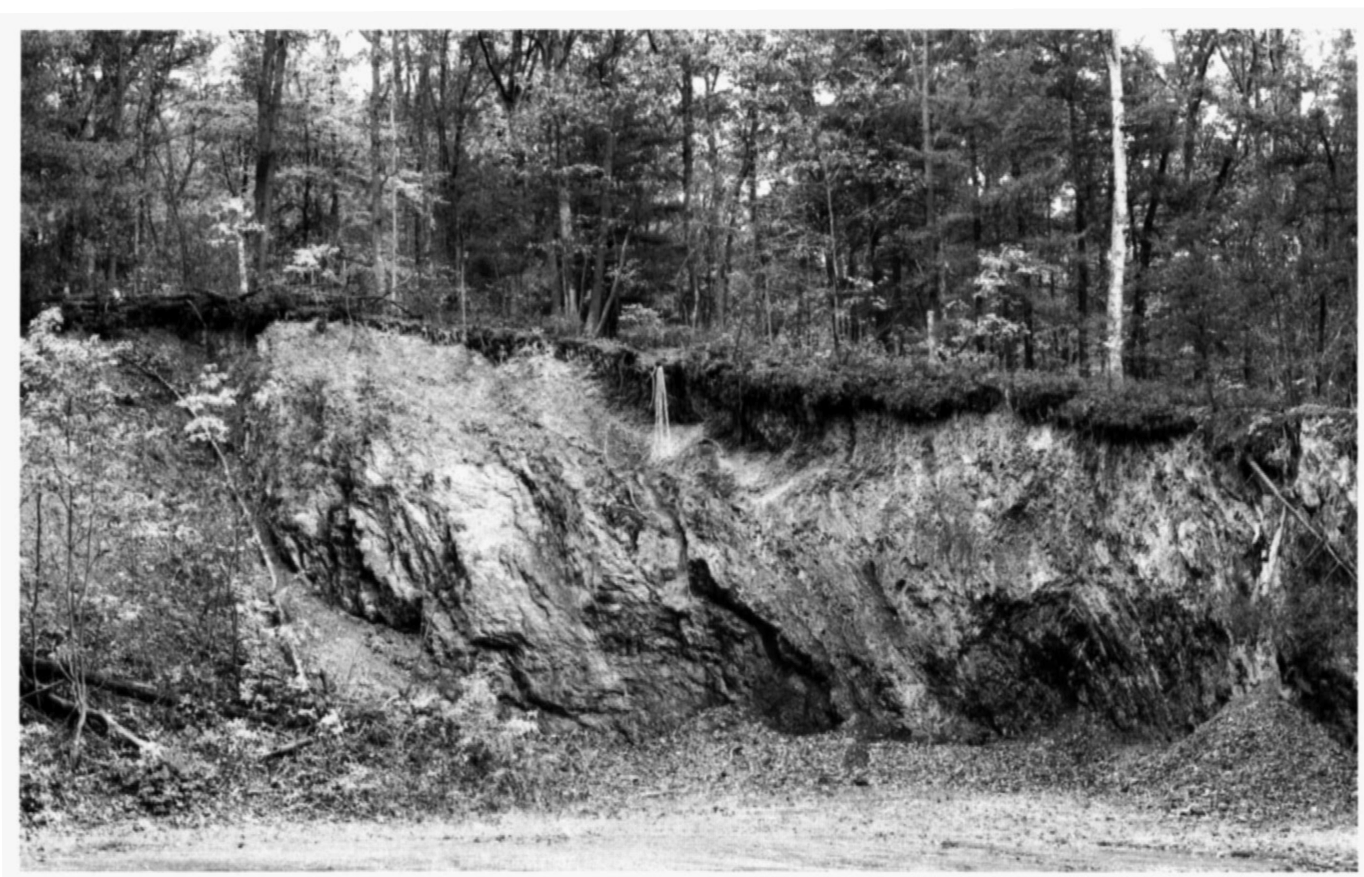

Figure 6.—A shale pit on Weikert very channery silt loam, 3 to 8 percent slopes. Shale pits in Washington County provide shale for various construction uses.

ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 54 percent. Humidity is higher at night, and the average at dawn is about 76 percent. The sun shines 67 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the west-northwest. Average windspeed is highest, 10 miles per hour, in March.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas, their location, and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size, and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from local and regional farm records and from local and regional field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Survey Procedures

This survey updates the soil survey of Washington County published in 1962 (USDA, 1962). It provides additional data and soil interpretations and larger maps, which show the soils in greater detail. The soils in this survey are described to a greater depth than in the previous survey. Many of the soil series and map unit names have been changed because of new information and changes in the national system for soil classification. Though some soil boundaries have been readjusted, many are essentially the same as those in the original survey.

The general procedures followed in making the survey are described in the "National Soil Survey Handbook" of the Natural Resources Conservation Service (USDA, NRCS, National Soil Survey Handbook). The previous Soil Survey of Washington County, Maryland, the geology map of Washington County, Maryland, and other references were used to prepare the manuscript and to plan the soil transacts.

Before fieldwork began, color infrared aerial photographs taken in March and April of 1988 at a scale of 1:1,000 feet were studied. These aerial photographs provided information that was significant in determining the location of certain soil boundaries in woodland areas. They were also used to locate representative areas for transacts and sampling sites. All the profile descriptions from the 1962 report representing the modal or central concept of the soil series were investigated and described using new terminology and nomenclature. They were used as a starting point for evaluating the old map units. A reconnaissance was made by vehicle before the landscape was traversed on foot. The field transacts were used to identify any changes needed in the central concept of the series and to determine map unit composition. Some areas required remapping, particularly areas near South Mountain, areas west of Clear Spring, and areas on alluvial flood plains. In the previous soil survey, many of these areas were mapped with less detail and at a less accurate level of soil classification. Soil boundaries were determined on the basis of soil examinations, observations, and photo interpretation.

Some of the soil series in the 1962 survey could not be used. New information on soil temperature, particle-size distribution, and water tables indicated the need for the establishment of new series. Many of the new series and some of the older series were sampled for chemical and physical analyses and for analyses of engineering properties. Full characterization analyses were made by the Soil Survey Laboratory in Lincoln, Nebraska. Particle-size distribution, mineralogy analyses, and special studies related to soils throughout the county were made by the Pedology Research Laboratory, Department of Agronomy, University of Maryland, College Park. A description of the laboratory procedures can be obtained on request from the laboratories. The results of the analyses and studies can be obtained from the laboratories or from the state office of the Natural Resources Conservation Service.

Formation of the Soils

Robert Knight, soil scientist, Natural Resources Conservation Service, Bedford, Pennsylvania, helped to prepare this section.

This section describes the five factors of soil formation in relation to the soils in Washington County. It also explains the morphology of the soils and the processes of soil formation.

Factors of Soil Formation

Soil is a three-dimensional body consisting of organic matter, mineral matter, air, and water. Soils formed through the chemical and physical weathering of geologic materials. The extent of the weathering and the characteristics of any soil depend on the nature of the parent rock; the climate; the relief, or lay of the land; the plant and animal life in and on the soil; and the length of time these factors have affected soil development.

In an area the size of Washington County, the vegetation and climate factors vary only slightly. The nature of the parent material and the relief are responsible for most of the differences in soil properties. The nature of the parent rock determines the texture and mineral content of the soils. Relief affects drainage, aeration, runoff, erosion, and exposure to sun and wind. Plants and animals cause physical and chemical removals and additions that influence soil characteristics. Climate influences the nature and extent of weathering. Soil forms over time through the processes of soil formation. Long periods of time generally are needed for soil development.

Parent Material

Parent material is the unconsolidated mass from which the soils are formed. It determines the mineralogical and chemical composition of the soil and, to a large extent, the rate at which soil-forming processes take place. In the early stages of soil formation, the mineralogical, physical, and chemical properties of the soil closely resemble those of the parent material. The composition of Weikert soils, for example, is similar to the acid shale in which they formed. As a soil ages, the processes of soil formation alter rocks and minerals, and the resulting soils generally have different characteristics. Thus, the properties of Hagerstown soils differ from those of the limestone parent material.

Many soils in Washington County formed in place in residuum directly over the original bedrock. Dekalb soils on major ridges formed in hard sandstone and quartzite, such as the Oriskany, Purslane, and Weverton formations. Pecktonville soils formed in cherty limestone, such as the Tonoloway and Helderberg formations. Berks and Weikert soils formed in olive, gray, and yellow acid shale, siltstone, and sandstone of the Martinsburg, Romney, and Chemung formations. They are similar to Calvin and Kliensville soils, which formed in red acid siltstone, shale, and sandstone from the Hampshire and Chemung formations. Wurno and Nollville soils formed in calcareous shale and interbedded limestone of the Wills Creek formation. Hagerstown and Opequon soils formed in purer limestone from the Rockdale Run and Conococheague formations and the St. Paul Group.

Murrill and Dryrun soils formed in transported sandstone and shale colluvium deposited over limestone. Sideling, Buchanan, and Andover soils formed in colluvium derived from mixed acid shale, siltstone, and sandstone. Pope, Philo, and Atkins soils formed in acid alluvium. Combs, Lindside, and Melvin soils formed in calcareous alluvium.

Parent material, specifically the kind of rock, also has had a major effect on topography in Washington County. Some rocks are much more susceptible to erosion and weathering than others. Mountains and ridges are underlain by quartzite and sandstone of the Purslane, Oriskany, Parkhead, and Weverton formations. Lower hills and valleys are underlain by shale and limestone of the Martinsburg, Chemung, Ellbrook, and Conococheague formations and the St. Paul Group.

Climate

The climate of Washington County is the humid-temperate, continental type. Some characteristics of the soils in the county indicate that this climate prevailed when the soils were forming and that it affected soil formation. Many of the soils are acid and strongly leached. The effect of climate on the formation of soils has been nearly uniform throughout the county. However, a microclimate caused by differences in relief may have affected the formation of some soils.

Plants and Animals

Vegetation, animals, bacteria, and fungi affect soil formation. The vegetation is generally responsible for the amount of nutrients. Burrowing animals, such as earthworms, cicadas, and others, help to keep the soil open and release nutrients for plant food. The native forests in Washington County have had more influence on soil formation than have any other living organisms. However, human activities have greatly influenced the surface layer. They include clearing the forests, plowing the land, adding fertilizers, mixing some of the soil horizons, and moving soil materials from place to place.

Relief

Steep ridges and narrow to broad, rolling valleys dominate the relief in Washington County. Relief in the county has been influenced by strongly folded sedimentary rocks and their degree of resistance or susceptibility to physical and chemical weathering and erosion. Dekalb and Hazleton soils are on the highest ridges. They formed in sandstone that is highly resistant to weathering. On the lower hills and ridges, Berks and Weikert soils formed in shale and siltstone, which is intermediate in resistance to weathering. In the broad, rolling valleys, such soils as Duffield and Hagerstown soils formed in limestone bedrock that is readily weathered. Lindside, Atkins, and Philo soils formed in recently deposited alluvium adjacent to streams. Downsville and Walkersville soils formed in the older water deposits on terraces.

Time

The length of time the factors of soil formation have acted on the weathered mineral material is indicated to some extent by the degree of development in the soil profile. Such soils as Pope, Philo, and Lindside soils, which formed in alluvium, are considered young, or recent, because their parent material has been in place for a shorter period of time than other soils in the county. These soils have less distinct horizonation than some older soils on uplands. Berks, Weikert, and Hazleton soils formed on uplands and show some horizon development. However, the effects of relief and the kind of parent material slowed weathering and profile development on Berks, Weikert, and Hazleton soils. Duffield, Hagerstown, and Pecktonville soils have well developed profiles. The parent material of Duffield, Hagerstown, and Pecktonville soils has been in place for a period of time long enough for distinct horizons to have developed.

Morphology of the Soils

The morphological features of soil are the result of soil-forming factors. They are expressed in the development of different layers, or horizons, which make up a soil profile. The soil profile extends from the surface down to material that is little altered by the soil-forming processes.

Most soils have three major horizons—the A, B, and C horizons. Some soils, particularly those in forests also have an O horizon at the surface. Numbers or lowercase letters indicate subdivisions of the major horizons. The Bt horizon, for example, has accumulated clay from the overlying horizons and is the most developed part of a B horizon. Hagerstown soils have a Bt horizon. The O horizon is an organic layer. It consists of organic material, such as twigs, leaves, dead roots, or humified organic matter, mixed with a small amount of mineral material. Soils of the forested areas, such as Bagtown, Dekalb, Hazleton, and Sideling soils, have a thin O horizon.

The A horizon is a mineral surface layer. Humified organic matter has darkened the horizon. In cultivated areas, the material in this horizon is mixed with material from the underlying horizons and the result is a plow layer, or an Ap horizon. The amount of humus or organic matter in the horizon varies in different soils and ranges from very low to very high. The organic matter content in the Ap horizon of Duffield and Hagerstown soils can range up to 4 percent in places.

The E horizon, which commonly occurs in well developed, undisturbed soils, is a mineral subsurface layer. It is characterized by intense leaching, or eluviation, of clay and iron. An E horizon occurs if considerable leaching has taken place and organic matter has not darkened the material. This horizon is normally lighter in color than any other horizon in the profile. Cultivated areas, where the material of the E horizon is commonly mixed with the overlying A horizon, may not have an E horizon.

The B horizon is a mineral subsoil layer. Normally, it underlies an Ap or E horizon. It is characterized by the accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer. In some soils, such as Myersville and Opequon soils, the B horizon formed through alteration of the original material and through accumulation or illuviation. The alteration can result from weathering of the parent material; the release of iron, which results in rusty colors; and the development of a soil structure in place of the structure of the original unconsolidated sediments. The B horizon commonly has a blocky or prismatic structure. It generally is firmer and lighter in color than the A horizon and is darker than the C and E horizons. Almost all the soils in Washington County have a B horizon.

The C horizon is a mineral substratum layer below an A or B horizon. It consists of material that is little altered by the soil-forming processes, but it may be modified by weathering. When the soil material of a C horizon is different than the parent material in which the overlying A and B horizons formed, the C horizon is labeled as a 2C horizon. Sideling soils have a 2C horizon. Most soils in Washington County have a C or 2C horizon. Some young soils, such as those that formed in recent alluvium, do not have an E or B horizon and the C horizon extends to or nearly to the surface, as in Hatboro soils.

Processes of Soil Formation

Soil forms through complex processes that can be grouped into four general categories: additions; removals, or losses; transfers (from one horizon to another); and transformations. These processes affect soil formation in differing degrees.

The accumulation and incorporation of organic matter in the surface layer is an example of an addition. This addition is responsible for the formation of the A horizon and is the main reason for the dark color of surface horizons in the mineral soils in Washington County. Heat from the sun and water from precipitation are also considered additions. These additions assist with chemical and physical reactions and affect other processes in the soil.

Carbonates, soluble salts, and the soluble products of mineral weathering that are leached from the soil profile are examples of removals. In the soils of Washington County, some of these compounds were removed before the parent materials were deposited. Another example of a removal is erosion. On sloping soils most of the surface layer may be lost and redeposited at the bottom of the slope or in a waterway. The deposited materials are considered an addition.

The translocation of clay from the A and E horizons to the B horizon, which occurs in many soils in the county, is an example of a transfer. In this process, clay is dispersed in the upper horizons and subsequently moved with percolating water into the lower horizons, where it may be deposited by filtering, flocculation, or both. Thus, the A or E horizon becomes a zone of eluviation, or loss, and the B horizon becomes a zone of illuviation, or gain. In Hagerstown, Duffield, Myersville, and Highfield soils, the B horizon has more clay than the parent material and the A and E horizons have less clay. In the B horizon of most soils, thin clay films are in pores and on faces of peds. The clay has been transferred from the A and E horizons.

Another important example of a transfer is the leaching or diffusion of iron in the soil. This process takes place under saturated soil conditions where there is no oxygen. The naturally well drained soils in the county have a yellowish brown or reddish brown subsoil. The color results from finely divided iron oxide minerals (ferric iron) that coat the sand, silt, and clay particles. Under saturated conditions, as in the poorly drained soils in the county, the iron oxide minerals are chemically reduced to a more soluble form (ferrous iron). This form of iron is transported with water and can be transported completely out of the horizon. The remaining uncoated soil particles have a predominantly gray color. Normally, part of the iron is reoxidized and segregated into the form of stains, concretions, or bright yellow and red soft masses within the horizon. In the poorly drained Melvin and Hatboro soils, this type of transfer has occurred throughout the profile. Other examples of transfers include the physical mixing of soil by animals, plants (as when trees tip over), and humans. Nutrient recycling (bringing mineral elements to the soil surface) by plants is also considered a transfer.

The weathering of primary materials to clay minerals in the soil is an example of a transformation. It occurs by physical and chemical means, such as by the transformation of micas and feldspars to clays. This process can increase the content of clay during soil formation. Another kind of transformation occurs when clay is derived from primary materials. Some iron generally is freed as a hydrated oxide. Depending on the degree of hydration, the oxide is generally red. Even a small amount of the oxide causes the subsoil to be reddish. Iron oxide colors the subsoil even in soils where not enough clay minerals have accumulated to form a textural B horizon, as in Berks soils.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

1. Hagerstown-Duffield-Ryder

Gently sloping to strongly sloping, well drained soils that formed in limestone

This map unit takes in most of the great limestone valley, from South Mountain west to Fairview Mountain. Slopes are 0 to 25 percent, but commonly are 3 to 15 percent. The unit makes up about 33 percent of the county. It is about 44 percent Hagerstown soils, 26 percent Duffield soils, 16 percent Ryder soils, and 14 percent soils of minor extent (fig. 7).

Hagerstown soils are very deep and well drained, and formed in relatively pure, hard and massive limestone. Duffield soils are very deep and well drained, and formed in impure, soft limestone. Ryder soils are moderately deep and well drained, and formed in impure, calcareous, shaly limestone and soft siltstone.

Of minor extent in this map unit are Funkstown and Swanpond soils, which are both very deep and moderately well drained. Funkstown soils are in upland drainageways and are subject to localized flooding. They have a thick, dark surface layer over a gravelly layer. Swanpond soils are on slightly concave, upland flats and in heads of drainageways. They are similar to Hagerstown soils.

Hagerstown, Duffield, and Ryder soils are well suited to corn, soybeans, small grain, hay, and pasture. These soils have many limestone outcrops that generally have a northeast-southwest orientation and that limit most agricultural practices. Limestone outcrops and shallow depth to bedrock are generally the only limitations to urban uses. A major concern is the potential for groundwater contamination because of sinkholes and caverns in limestone bedrock.

2. Hagerstown-Opequon

Gently sloping to strongly sloping, well drained soils that formed in limestone

This map unit takes in part of the great limestone valley along the west side of the Conococheague River from Pinesburg to Fairview and the Maryland State line. Slopes are 0 to 25 percent, but commonly are 3 to 15 percent. The unit makes up about 9 percent of the county. It is about 67 percent Hagerstown soils, 22 percent Opequon soils, and 11 percent soils of minor extent (fig. 8).

Hagerstown soils are very deep and well drained. They formed in relatively pure, hard and massive, yellowish red limestone. Opequon soils are shallow to hard limestone.

Of minor extent in this map unit are Funkstown and Swanpond soils, which are both very deep and moderately well drained. Funkstown soils are in upland drainageways and are subject to localized flooding. They have a thick, dark surface layer over a gravelly layer. Swanpond soils are on slightly concave, upland flats and in heads of drainageways. They are similar to Hagerstown soils.

In areas without rock outcrops, Hagerstown and Opequon soils are well suited to small grains, corn, soybeans, hay, and pasture. Droughtiness is a limitation on Opequon soils. On both Hagerstown and Opequon soils rock outcrops, shallow depth to bedrock, potential development of sinkholes, and

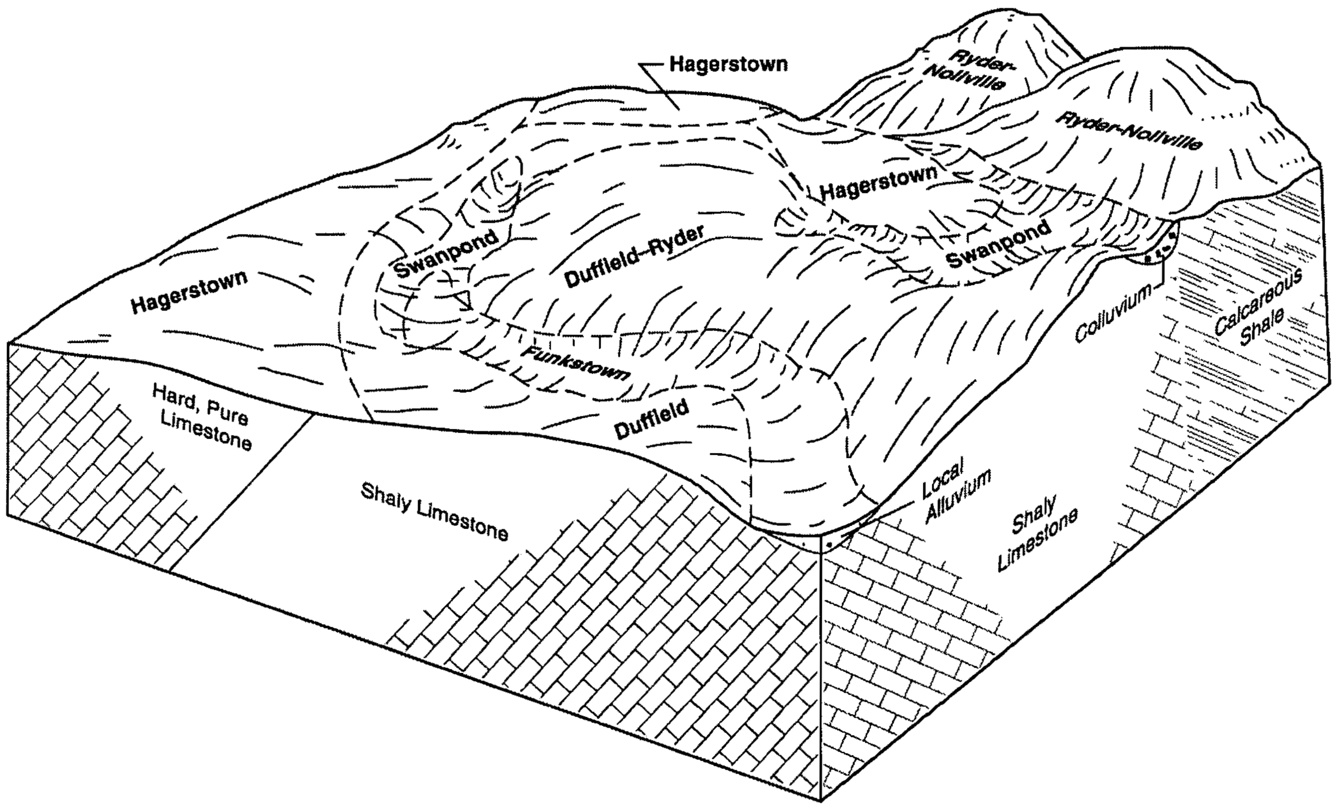

Figure 7.—Relationship of soils to topography and underlying material in the Hagerstown-Duffield-Ryder and the Ryder-Nollville general soil map units.

potential contamination of groundwater are major limitations for both agricultural and nonagricultural uses.

3. Ryder-Nollville

Gently sloping to strongly sloping, well drained soils that formed in both calcareous and shaly limestone

This map unit takes in a small part of the great limestone valley east of Antietam Creek. Slopes are 3 to 25 percent, but commonly are 3 to 15 percent. It makes up about 2 percent of the county. It is about 69 percent Ryder soils, 17 percent Nollville soils, and 14 percent soils of minor extent.

Ryder soils are well drained and moderately deep to soft, shaly limestone. They have a subsoil of channery loam. Nollville soils are deep and well drained. They have a loamy subsoil and formed in relatively impure, calcareous, yellowish red shale.

Of minor extent in this map unit are Funkstown and Swanpond soils. Funkstown soils are in upland drainageways and are subject to localized flooding. They have a thick, dark surface layer over a gravelly layer. Swanpond soils are on slightly concave, upland flats and in heads of drainageways. They are similar to Hagerstown soils.

Ryder and Nollville soils are well suited to corn, soybeans, small grain, hay, pasture, and orchards. The acreage of both soils is almost evenly divided between cropland and orchards. These soils are well suited to most nonagricultural uses.

4. Weikert-Berks-Clearbrook

Gently sloping to strongly sloping, well drained to somewhat poorly drained soils that formed in acid shale

This map unit is in the areas west of Fairview Mountain and in a narrow strip along the Conococheague River. Slopes are 0 to 65 percent, but commonly are 3 to 25 percent. The unit makes up about 9 percent of the county. It is about 68 percent Weikert soils, 19 percent Berks soils, 9 percent Clearbrook soils, and 6 percent soils of minor extent (fig. 9).

Weikert soils are shallow and well drained. They formed in olive, acid shale bedrock on ridges and on dissected slopes along drainageways. Berks soils are moderately deep and well drained. They formed in olive, acid shale bedrock on broad, upland flats.

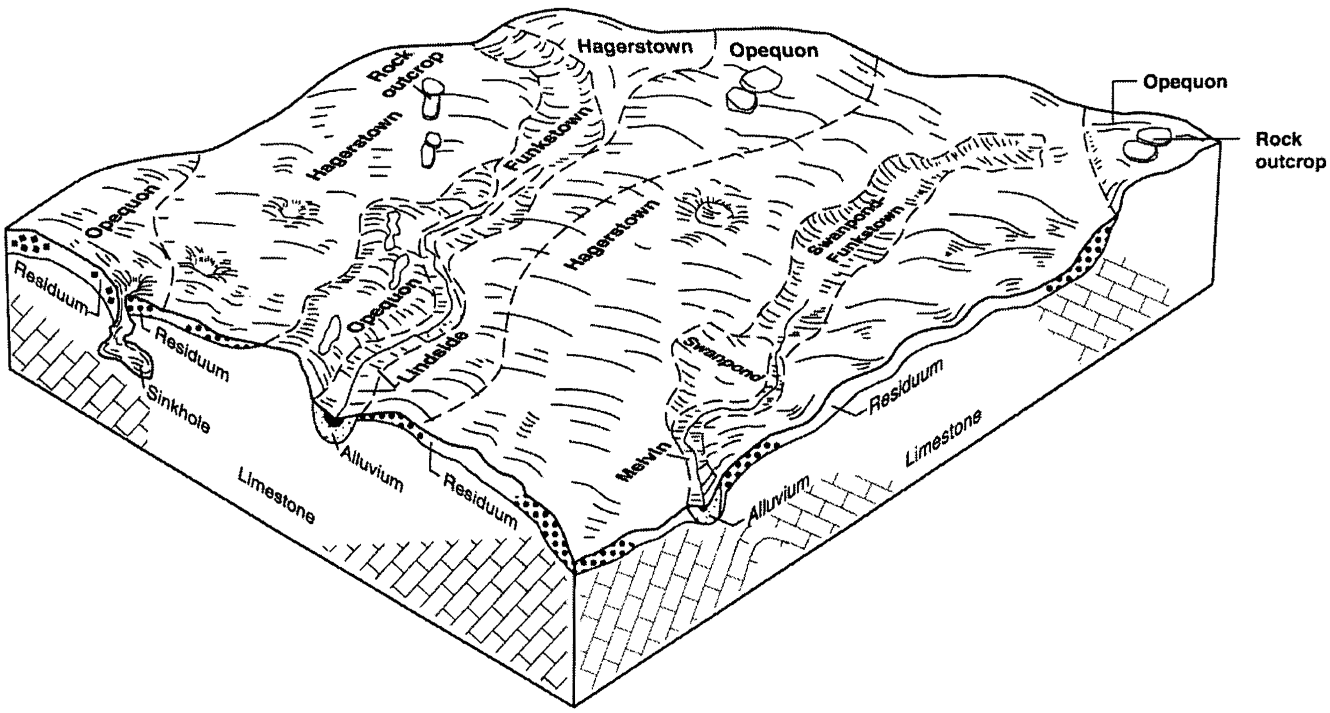

Figure 8.—Relationship of soils to topography and underlying material in the Hagerstown-Opequon general soil map unit.

Clearbrook soils are moderately deep and somewhat poorly drained. They are in upland drainageways.

Of minor extent in this map unit are Brinkerton soils. Brinkerton soils are in the lower landscape positions along drainageways and in depressions. They are shallow and droughty.

Most farmed areas of Weikert, Berks, and Clearbrook soils are used for corn and small grain, but mostly for pasture or hay. Most of the acreage of Brinkerton soils is in low grade trees.

5. Murrill-Dryrun

Level to moderately sloping, well drained or moderately well drained soils that formed in colluvium derived from sandstone, shale, and limestone

This map unit is in areas near Clear Spring, along the base of South Mountain from the State line to just north of Rohrersville, along the western side of Elk Ridge, and in isolated areas within the Great Valley. Slopes are 0 to 25 percent, but commonly are 0 to 8 percent. The unit makes up about 5 percent of the county. It is about 79 percent Murrill soils and 21 percent Dryrun soils (fig. 10).

Murrill soils are very deep and well drained. They have a gravelly loamy subsoil over heavy, red clay derived from limestone. They are on gently sloping uplands.

Dryrun soils are moderately well drained and have a seasonal high water table at a depth of 2 to 3 feet. They have a gravelly loamy subsoil over heavy, red clay derived from limestone generally at a depth of more than 7 feet. They are on old, alluvial fans on stream terraces.

Murrill and Dryrun soils are well suited to corn, soybeans, small grain, hay, and pasture. Murrill soils are well suited to most nonagricultural practices. Because of seasonal wetness, Dryrun soils are poorly suited to some nonagricultural practices.

6. Bagtown-Dekalb-Weverton

Gently sloping to very steep, well drained or moderately well drained soils formed in both quartzite and phyllite

This map unit is near South Mountain and Elk Ridge in Washington County. Slopes are 3 to 65 percent, but commonly are 15 to 25 percent. The unit makes up about 7 percent of the county. It is about 43 percent Bagtown soils, 26 percent Dekalb soils, 18 percent Weverton soils, and 13 percent soils of minor extent.

Bagtown soils are moderately well drained and have a seasonal high water table at a depth of 3 to 4 feet. They are very deep and have a gravelly loamy subsoil. They are on the the middle or lower slopes of mountains.

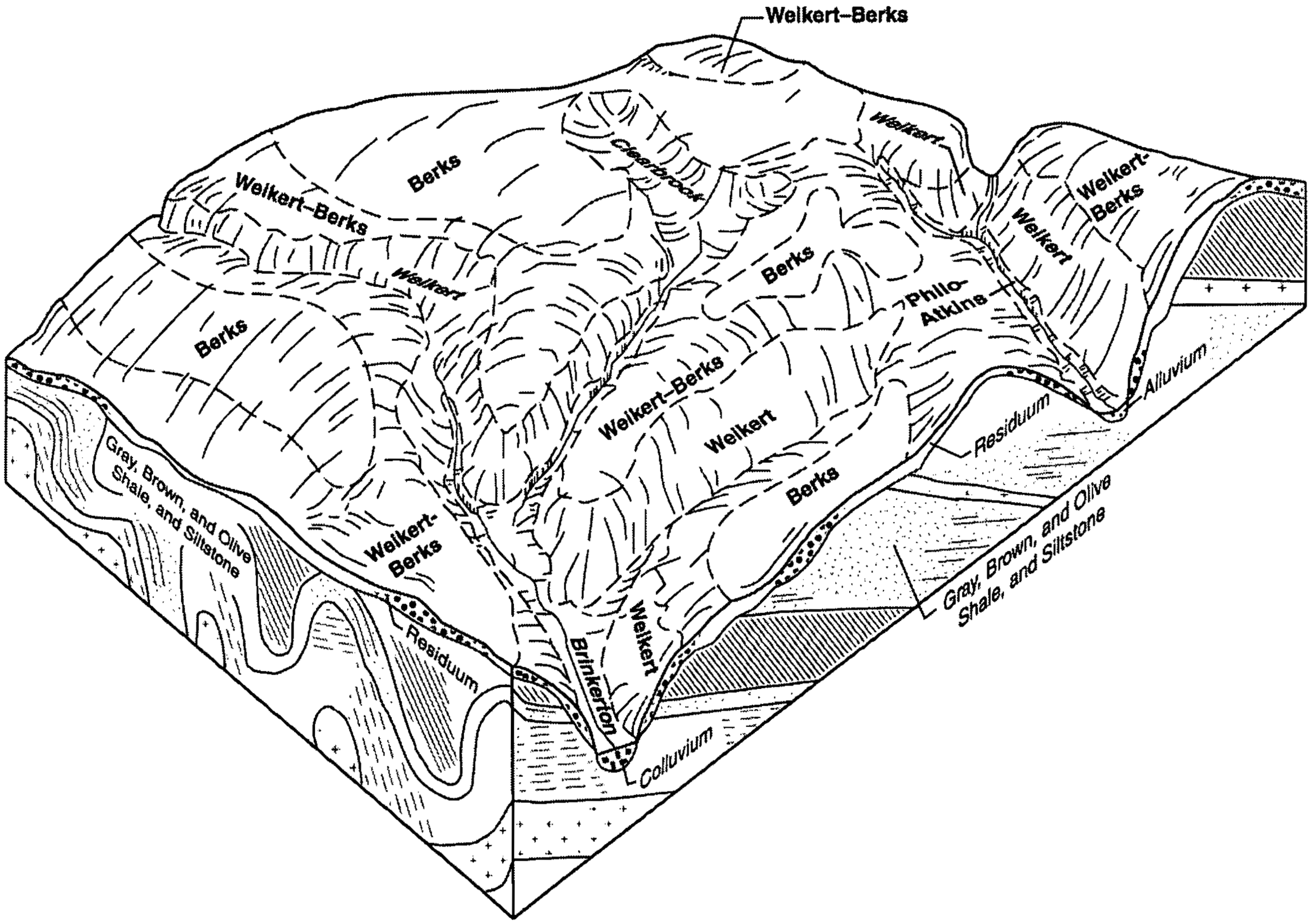

Figure 9.—Relationship of soils to topography and underlying material in the Weikert-Berks-Clearbrook general soil map unit.

Dekalb soils are moderately deep and well drained. They are on gently sloping ridgetops and on the upper slopes of South Mountain and Elk Ridge.

Weverton soils are deep and well drained. They have a gravelly loamy subsoil over very channery material influenced by phyllite. They are on the lower benches and knobs of mountains.

Of minor extent in this map unit are Airmont soils. Airmont soils are along drainageways and in depressions.

Bagtown, Dekalb, and Weverton soils are well suited to tree production. They are unsuited to agricultural use and to most urban uses. The main limitations are slope, stones on the surface, depth to bedrock, and wetness.

7. Thurmont-Braddock-Trego

Gently sloping to moderately steep, well drained or moderately well drained soils that formed in both quartzite and phyllite

This map unit is on foot slopes along South Mountain and near Elk Ridge. Slopes are 0 to 25 percent, but commonly are 3 to 15 percent. The unit makes up about 3 percent of the county. It is about 38 percent Thurmont soils, 35 percent Braddock soils, and 27 percent Trego soils.

Thurmont soils are well drained and have a seasonal high water table below a depth of 4 feet. They are very deep, and have a gravelly loamy subsoil. They are on gently sloping footslopes and interfluves of South Mountain and Elk Ridge.

Braddock soils are well drained and have a seasonal high water table below a depth of 4 feet. They are on gently sloping to moderately steep, colluvial fans and on footslopes along South Mountain and Elk Ridge.

Trego soils are moderately well drained and have a seasonal high water table at a depth of 1.5 to 2 feet. They are very deep and have a gravelly loamy subsoil. They are on old alluvial fans and old stream terraces.

Thurmont, Braddock, and Trego soils are well suited to corn, soybeans, small grain, hay, pasture, and tree

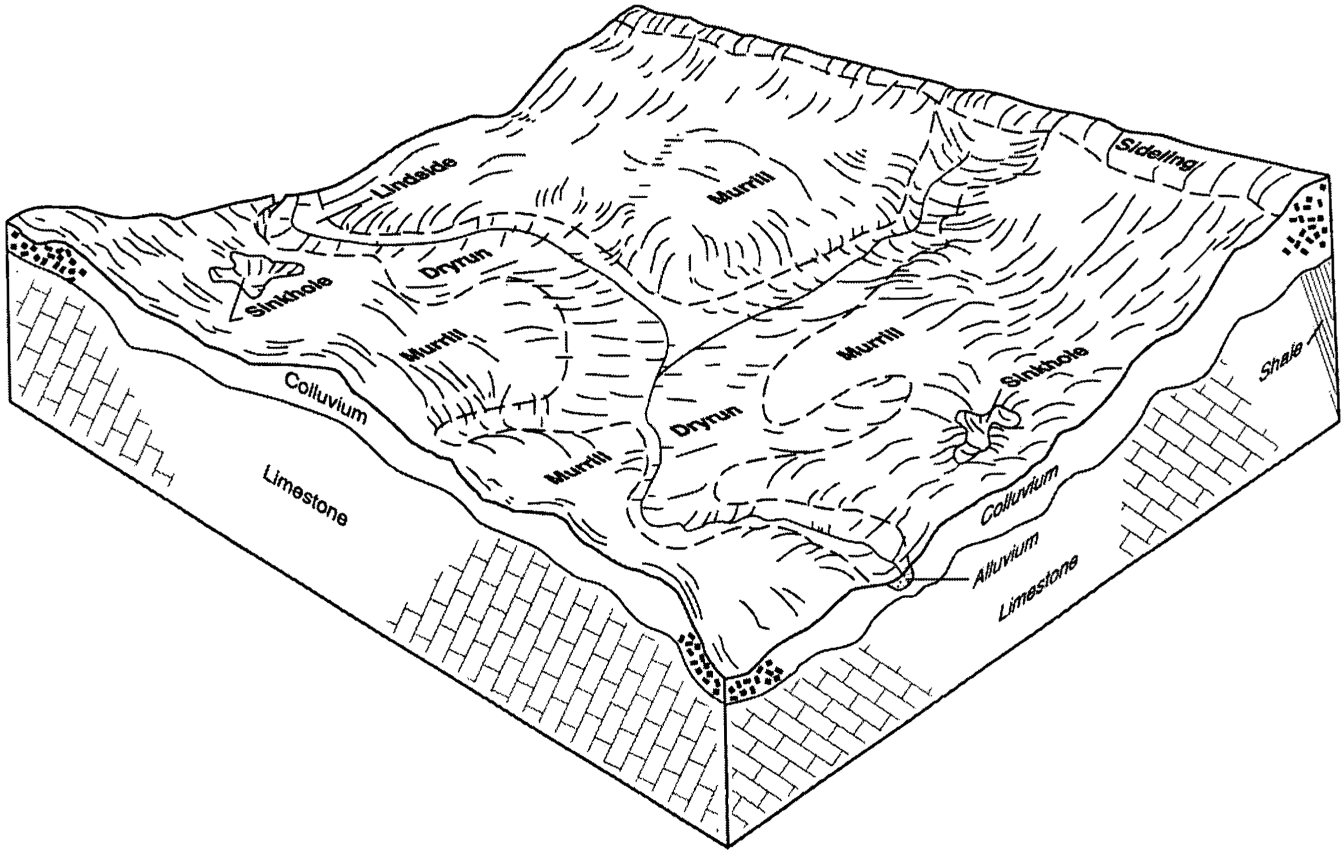

Figure 10.—Relationship of soils to topography and underlying material in the Murrill-Dryrun general soil map unit.

production. Near Braddock water ponds in depressions on these soils. Wetness is a major limitation for most nonagricultural uses.

8. Myersville-Ravenrock-Catoctin

Gently sloping to very steep, very deep, well drained soils that formed in a mixture of metarhyolite, metaandesite, and metabasalt called greenstone

This map unit is on ridges and in valleys along South Mountain, near Pen Mar south to near Smithsburg, from Rohrersville to the Potomac River, and west to Elk Ridge. Slopes are 3 to 65 percent, but are commonly 3 to 25 percent. The unit makes up about 4 percent of the county. It is about 31 percent Myersville soils, 25 percent Ravenrock soils, 14 percent Catoctin soils, and 30 percent soils of minor extent.

Myersville soils are very deep and well drained. They have a loamy subsoil. They are on gently sloping ridgetops and in farmed areas in valleys from Rohrersville to the Potomac River. Ravenrock soils are well drained. They have a seasonal high water table below a depth of 4 feet. They have a gravelly loamy subsoil. They are on gently sloping to steep, colluvial slopes of mountains. Catoctin soils are well drained and moderately deep. They have a gravelly loamy subsoil. They are on convex knobs and eroded backslopes.

Of minor extent in this map unit are Mt. Zion, Highfield, Lantz, and Rohrersville soils. Highfield soils are on ridgetops and the upper slopes of South Mountain in the northern part of the county and on the lower slopes in the southern part of the county. Mt. Zion soils are moderately well drained and very deep. They have a seasonal high water table at a depth of 2 or 3 feet and a loamy subsoil. They are on slightly convex footslopes, the lower backslopes, and flats on uplands. Highfield soils are well drained and have a gravelly loamy subsoil. Rohrersville and Lantz soils are very deep and are somewhat poorly drained and poorly drained, respectively. They are on headslopes and flats on uplands, in drainageways, and in depressions.

Myersville, Catoctin, and Mt. Zion soils are well suited to corn, soybeans, small grain, hay, and pasture. Highfield and Ravenrock soils are well suited to tree production. Because of slope and stoniness, they are poorly suited to agricultural production. Myersville and Highfield soils are well suited to most nonagricultural uses. Seasonal wetness is a limitation of Lantz, Mt. Zion, Ravenrock, and Rohrersville soils for nonagricultural uses.

9. Hazel-Talladega

Gently sloping to strongly sloping, well drained, moderately deep or deep soils that formed in phyllite

This is a map unit of limited extent near Dargan, just south of Boonsboro, and near Chestnut Grove. Slopes are 0 to 65 percent, but commonly are 3 to 25 percent. The unit makes up about 2 percent of the county. It is about 73 percent Hazel soils and 27 percent Talladega soils.

Hazel soils are moderately deep and well drained. They have a very channery, loamy subsoil. They are on narrow ridgetops and on eroded side slopes and knobs. Talladega soils are deep and well drained. They have a channery loamy subsoil. They are on gently sloping summits, flats, and side slopes on uplands.

Because of low natural fertility and shallow depth to bedrock, Hazel and Talladega soils are poorly suited to corn, soybeans, small grain, and hay. Most of the acreage of these soils is in tree production or pasture. These soils have severe limitations for most nonagricultural uses.

10. Dekalb-Sideling-Hazleton

Gently sloping to very steep, well drained or moderately well drained soils that formed in mixed sandstone, shale, and siltstone

This map unit is on ridges from Fairview Mountain west to Sideling Hill (fig. 11). Slopes are 3 to 65 percent, but commonly are 25 percent. The unit makes up about 6 percent of the county. It is about 41 percent Dekalb soils, 40 percent Sideling soils, 10 percent Hazleton soils, and 9 percent soils of minor extent (fig. 12).

Dekalb soils are well drained and moderately deep. They have a gravelly loamy subsoil. Dekalb soils are on gently sloping ridgetops. Sideling soils are very deep and moderately well drained. They have a seasonal high water table at a depth of 2 to 4 feet. They have a gravelly loamy subsoil over a heavier material influenced by underlying shale. They are on the lower footslopes and on benches of mountains. Hazleton soils are on the upper or middle slopes of mountains.

Figure 11.—The cut through Sideling Hill, exposing synclinal formations. The Dekalb-Sideling-Hazleton general soil map unit is on the summit of Sideling Hill.

Of minor extent in this map unit are Andover and Buchanan soils. Buchanan soils are moderately well drained, and Andover soils are poorly drained.

Dekalb, Sideling, and Hazleton soils have stones on the surface and are moderately steep or steep. They are best suited to use as forest and as habitat for woodland wildlife. On steep slopes they are poorly suited to agricultural uses and to most urban uses.

11. Klinesville-Calvin

Gently sloping to very steep, well drained, moderately deep to shallow soils that formed in acid, red shale and sandstone

This map unit extends west of Fairview Mountain to Sideling Creek. Slopes are 0 to 65 percent, but are commonly 3 to 25 percent. It makes up about 4 percent of the county. It is 61 percent Klinesville soils, 38 percent Calvin soils, and 1 percent soils of minor extent (fig. 13).

Klinesville soils are well drained and shallow to red, acid shale and sandstone bedrock. They have a very channery loamy subsoil. They are on ridges and dissected slopes along drainageways. Calvin soils are well drained and moderately deep to acid, red shale and sandstone bedrock. They have a channery loamy subsoil.

Of minor extent in this map unit are Clearbrook soils in drainageways on uplands.

Most of the acreage of Klinesville and Calvin soils are in tree production. In isolated areas they are used for hay and pasture. In some areas they are used for corn, small grain, and some old orchards. Because they are shallow and droughty and on steep slopes, these soils are not well suited to tree production or agricultural use. These soils are also limited to some urban uses because of depth of bedrock and, in some areas, slope.

12. Wurno-Pecktonville-Nollville

Gently sloping to strongly sloping, well drained soils that formed in shaly limestone and cherty limestone

The largest extent of this map unit ranges from Hancock west to Tonoloway Ridge (fig. 14). The unit is

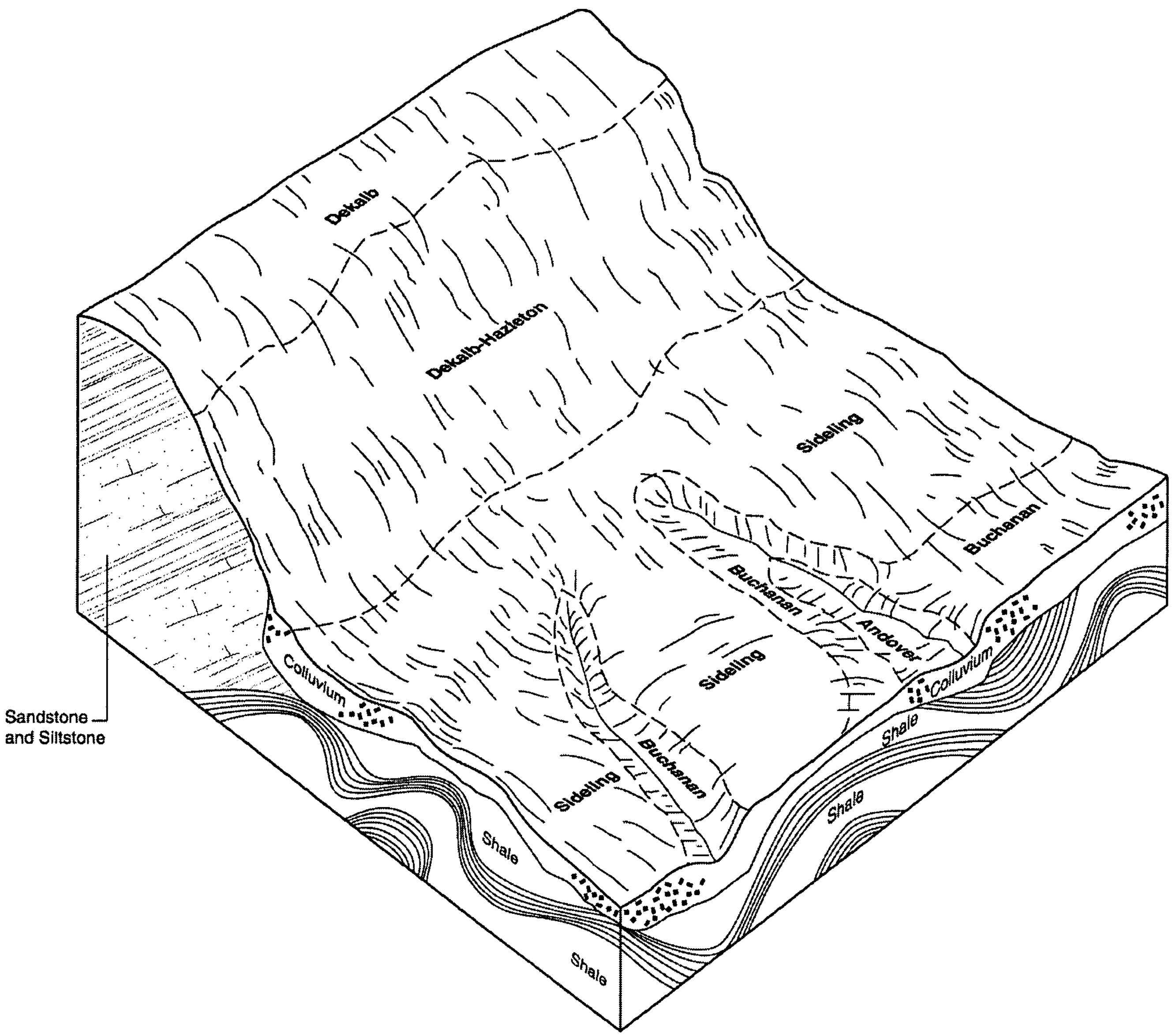

Figure 12.—Relationship of soils to topography and underlying material in the Dekalb-Sideling-Hazleton general soil map unit.

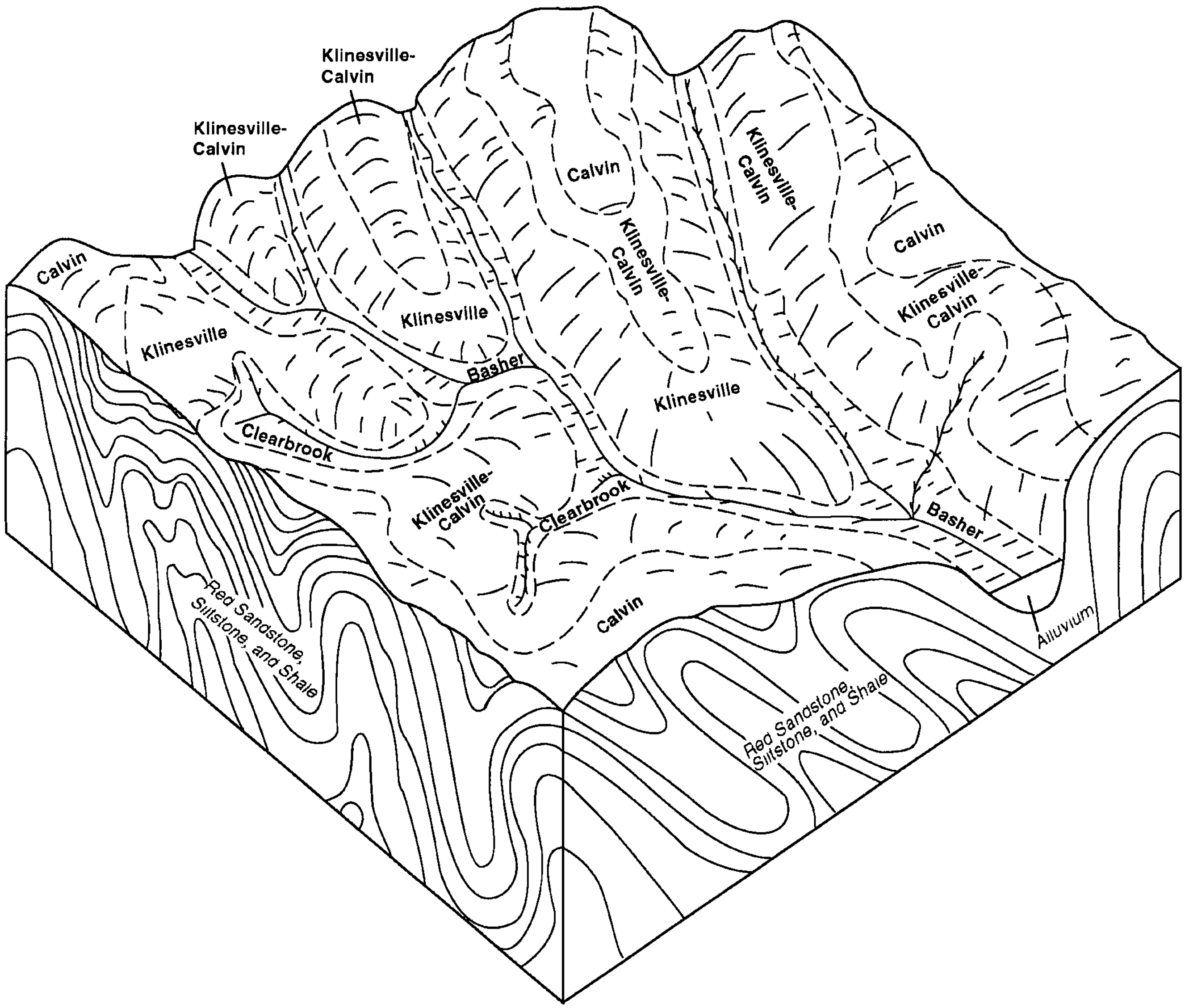

Figure 13.—Relationship of soils to topography and underlying material in the Klinesville-Calvin general soil map unit.

also in isolated areas near Elbow Ridge and in a valley between Bear Pond Mountain and Coon Ridge. Slopes are 0 to 25 percent, but commonly are 3 to 15 percent. The unit makes up about 4 percent of the county. It is about 52 percent Wurno soils, 41 percent Pecktonville soils, 4 percent Nollville soils, and 3 percent soils of minor extent.

Wurno soils are moderately deep and well drained. They have a very channery, loamy subsoil. They formed in impure, soft, calcareous shale. They are on narrow ridgetops and eroded side slopes and knobs. Pecktonville soils are very deep and well drained. They have a seasonal high water table below a depth of 40 inches. They have very gravelly loamy material in the upper part of the subsoil and heavy, loamy material in the lower part. These soils formed in impure, cherty limestone. Nollville soils are very deep and well drained. They formed in impure, shaly limestone and have a loamy, red subsoil. They are on gently sloping side slopes and in the lower landscape positions.

Of minor extent in this map unit are Funkstown and Swanpond soils. Funkstown and Swanpond soils are very deep and moderately well drained. Funkstown soils are in upland drainageways. They have a thick, dark surface layer over a gravelly layer. They are subject to localized flooding. Swanpond soils are on slightly concave, upland flats and in heads of drainageways. They are similar to Hagerstown soils.

Wurno, Pecktonville, and Nollville soils are well suited to hay, pasture, and orchards. In most areas the soils are in abandoned orchards or in idle hay and pasture. They are well suited to forest production.

Figure 14.—Typical landscape of Wurno-Nollville channery silt loams, part of the Wurno-Pecktonville-Nollville general soil map unit, near Hancock.

Shallow depth to bedrock on Wurno soils and the seasonal high water table on Pecktonville soils are limitations for most urban uses.

13. Downsville-Monongahela-Walkersville

Gently sloping to very steep, well drained or moderately well drained soils that formed in a mixture of sandstone, shale, and siltstone

This map unit is on old stream terraces along the Potomac River, Conococheague Creek, Antietam Creek, Licking Creek, and Sideling Creek (fig. 15). Slopes are 0 to 25 percent, but commonly are 0 to 15 percent. The unit makes up about 5 percent of the county. It is about 55 percent Downsville soils, 28 percent Monongahela soils, 13 percent Walkersville soils, and 4 percent soils of minor extent.

Downsville soils are well drained and very deep. They have a very gravelly, loamy subsoil. Downsville soils are on old, high stream terraces along the Potomac River and Licking Creek. In a few areas limestone outcrops are along the Potomac River. Monongahela soils are moderately well drained and very deep and have a loamy subsoil. They have a fragipan that restricts the downward movement of water and roots. Monongahela soils are on the lower stream terraces along Conococheague Creek, Licking Creek, and the Potomac River. Walkersville soils are well drained and very deep. They formed on old stream terraces over limestone mostly along Antietam Creek and Beaver Creek.

Of minor extent in this map unit are the somewhat poorly drained Tyler soils.

Downsville, Monongahela, and Walkersville soils are well suited to corn, soybeans, small grain, hay, and pasture. Large cobbles on these soils can interfere with some agricultural practices. Downsville and Walkersville soils are well suited to most nonagricultural uses and tree production. A seasonal high water table limits Monongahela soils for many nonagricultural uses.

14. Lindside-Deposit-Combs-Melvin

Nearly level to gently sloping, well drained to poorly drained, very deep soils that formed in marl, limestone, sandstone, shale, greenstone, quartzite, and phyllite

This map unit is on landscapes near perennial streams. It makes up about 7 percent of the county. It is about 13 percent Lindside soils, 12 percent

Figure 15.—Typical landscape of flood plains and stream terraces in Licking Creek Valley, north of Pecktonville. Philo gravelly sandy loam is on the flood plain. Downsville gravelly loam is on terraces. The wooded strips between fields are on Weikert channery silt loam.

Deposit soils, 6 percent Combs soils, 9 percent Melvin soils, and 60 percent soils of minor extent.

Of minor extent in this map unit are Philo, Pope, Bigpool, Atkins, Basher, Combs, Deposit, Fairplay, Lindside, Lappans, Melvin, Codorus, Hatboro, and Foxville soils.

Philo, Pope, Bigpool, and Atkins soils are along the Potomac River west of Williamsport and along major streams west of Clearspring. Basher soils are along major streams associated with red shale and sandstone. Combs, Deposit, Fairplay, Lindside, Lappans, and Melvin soils are in the Hagerstown Valley. Codorus, Hatboro, and Foxville soils are in the Blue Ridge region of the Israeli Creek Valley and near Pleasant Valley and Dargan.

The well drained Codorus, Combs, Lappans, and Pope soils and the moderately well drained Lindside, Philo, Bigpool, and Basher soils in this map unit are excellent for corn, soybeans, small grain, hay, and pasture. The poorly drained Atkins, Melvin, and Hatboro soils are well suited to use as habitat for wetland wildlife. Flooding is a severe limitation to the poorly drained soils for urban uses. The somewhat poorly drained Deposit and Foxville soils and the very poorly drained Fairplay soils are suited to habitat for wetland wildlife. These soils have severe limitations for urban uses because of flooding and the seasonal high water table.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1998, and Soil Survey Staff, 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 6 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning wet, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning flood plains, plus *aquent*, the suborder of the Entisols that has a aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, nonacid, mesic Typic Fluvaquents.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Detailed Soil Map Units

In this section, arranged in alphabetical order, each soil series recognized in the survey area is described. Each description is followed by the detailed soil map unit or units associated with the series.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Staff, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1999) and in "Keys to Soil Taxonomy" (Soil Survey Staff, 1998). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading "Use and Management of the Soils."

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to taxonomic classes other than those of the major soils.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They are listed in the map unit under the heading "Additional Components." They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. A few included areas, be they noncontrasting or contrasting components, may not have been observed, and consequently they are not mentioned in the descriptions. They were not observed because the soils pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use.

On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Hagerstown silty clay loam, 3 to 8 percent slopes, very rocky, is a phase of the Hagerstown series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Hagerstown-Rock outcrop complex, 8 to 15 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Foxville and Hatboro soils is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. Quarry, limestone, is an example.

Table 7 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Airmont Series

The Airmont series consists of very deep, moderately well drained soils. Permeability is moderately rapid above the fragipan and slow in the fragipan. These soils formed in acid colluvium derived from quartzite, phyllite, and siltstone. They are on concave backslopes and footslopes on mountains in the eastern part of Washington County. Slopes range from 3 to 25 percent.

Airmont soils are similar to Trego soils and are mapped adjacent to Bagtown, Dekalb, Hazel, Talladega, Thurmont, and Weverton soils. Trego soils are on lower colluvial footslopes and on alluvial fans. They are less than 35 percent rock fragments throughout. Bagtown soils are moderately well drained. Thurmont and Weverton soils are well drained and do not have a fragipan. Dekalb soils are on summits of ridges, have bedrock at shallower depths than Airmont soils, and do not have a fragipan. Hazel and Talladega soils formed in residuum derived from phyllite, do not have a fragipan, and are well drained.

Typical pedon of Airmont cobbly loam, 8 to 25 percent slopes, extremely stony, in forestland, 3,000 feet east of intersection of Burnished Bridge Road and Mills Road, 600 feet south from Burnished Bridge Road; near Chestnut Grove; lat. 39 degrees 25 minutes 53 seconds N. and long. 77 degrees 42 minutes 41 seconds W.

Oi—0 to 1 inch; leaf and twig matter, 5 percent stones.

A—1 to 2 inches; dark grayish brown (10YR 4/2) cobbly loam; weak fine granular structure; friable; many fine and medium and few coarse roots; few fine tubular pores; 20 percent cobbles, 10 percent gravel, 5 percent stones; moderately acid; clear irregular boundary.

E—2 to 7 inches; light yellowish brown (10YR 6/4) very cobbly loam; many coarse distinct brown (10YR 5/3) organic stains and films; weak fine granular structure; very friable; many fine, common medium, and few coarse roots; few fine vesicular and tubular pores; 25 percent cobbles and 20 percent gravel; strongly acid; 5 percent stones; clear wavy boundary.

BE—7 to 15 inches; brownish yellow (10YR 6/6) cobbly sandy loam; moderate fine and medium subangular blocky structure; friable; common fine and medium roots; common fine and few medium vesicular and tubular pores; 15 percent cobbles and 15 percent gravel; strongly acid; clear wavy boundary.

Bt1—15 to 25 inches; brownish yellow (10YR 6/6) cobbly sandy clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; common fine and few medium roots; many fine and common medium vesicular and tubular pores; common distinct clay films on faces of peds; 20 percent cobbles and 15 percent gravel; strongly acid; clear wavy boundary.

Bt2—25 to 31 inches; brownish yellow (10YR 6/6) very cobbly sandy clay loam; weak very coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots restricted to structural units; many fine vesicular and tubular pores; common medium prominent strong brown (7.5YR 5/8) vertical iron accumulation streaks between prisms faces; common medium distinct light gray (10YR 7/1) vertical iron depletion streaks between prism faces; common fine distinct dusky red (2.5YR 3/2) iron stains; common distinct clay skins on faces of peds and lining pores; 25 percent cobbles and 15 percent gravel; strongly acid; abrupt wavy boundary.

Bt3—31 to 39 inches; brownish yellow (10YR 6/6) cobbly loam; moderate very coarse prismatic structure parting to moderate medium subangular blocky; friable; few fine and medium roots restricted to structural units; common fine and few medium vesicular and tubular pores; common coarse distinct light gray (10YR 7/1) and very pale brown (10YR 7/3) iron depletions and common coarse distinct strong brown (7.5YR 5/8) iron accumulations; many distinct clay skins on faces of peds and lining pores; 25 percent cobbles and 10 percent gravel; very strongly acid; abrupt wavy boundary.

Btx1—39 to 51 inches; brownish yellow (10YR 6/6) very gravelly sandy loam; moderate very coarse prismatic structure parting to moderate medium platy; very firm; few fine and medium roots confined to prism faces; few fine and medium vesicular and tubular pores; common coarse prominent strong brown (7.5YR 5/8) vertical iron accumulation streaks between prism faces; common coarse prominent gray (10YR 6/1) vertical iron depletion streaks between prism faces; common fine prominent dark reddish brown (2.5YR 3/2) iron stains; common distinct clay films on faces of peds and lining pores; 15 percent cobbles and 30 percent gravel; very strongly acid; gradual wavy boundary.

Btx2—51 to 64 inches; yellow (2.5Y 7/6) gravelly sandy loam; moderate very coarse prismatic structure parting to moderate medium platy; very firm; few fine roots confined to prism faces; many fine and medium vesicular and tubular pores; common coarse prominent light gray (10YR 7/1) iron depletions; common coarse prominent strong brown (7.5YR 5/8) iron accumulations; common coarse prominent reddish brown (2.5YR 3/2) iron stains on faces of peds; 5 percent cobbles and 30 percent gravel; very strongly acid.

The solum ranges from 30 to 60 inches. Unconforming bedrock is at a depth of 6 to 20 feet or more. Depth to the fragipan ranges from 24 to 50 inches. Surface stones cover 1 to 15 percent of the surface. The content and size of rock fragments increase with depth and range from 35 to 50 percent in the solum and the fragipan and from 35 to 55 percent in the C horizon. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 3 to 6. Texture of the fine earth fraction is loam or sandy loam.

The E and BE horizons have hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. Texture of the fine earth fraction is loam or sandy loam.

The Bt horizon has hue of 7.5YR to 10YR, value 5 or 6, and chroma of 4 to 8. Texture of the fine earth fraction is loam, sandy clay loam, or fine sandy loam.

The Btx horizon has hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. Texture of the fine earth fraction is fine sandy loam, sandy loam, loam, sandy clay loam, clay loam, or silt loam.

The C horizon, where it occurs, has hue of 7.5YR to 10YR, value 5 or 6, and chroma of 5 to 8. Texture of the fine earth fraction is fine sandy loam, sandy loam, loam, sandy clay loam, clay loam, or silt loam.

AmB—Airmont cobbly loam, 3 to 8 percent slopes, extremely stony

Map Unit Setting

Landscape: Mountains
Note: Some areas in the unit have a rubbly or stony surface. Some small areas of poorly drained soils are along the center of drainageways.

Component Description

Airmont and similar soils

Composition: 85 percent
Landform: Drainageways on head slopes or base slopes on mountains
Slope: 3 to 8 percent
Texture of the surface layer: Cobbly loam
Depth to a restrictive feature: Fragipan at a depth of 24 to 40 inches
Drainage class: Moderately well drained
Parent material: Gravelly colluvium derived from quartzite
Flooding: None
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 4.0 inches
Note: In places the fragipan is weakly expressed.

A typical soil description is included in this section (see “Index to Series”). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see “Summary of Tables”).

Additional Components

Deposit and similar soils

Composition: 5 percent
Landform: Flood plains and narrow, high-gradient flood plains

Thurmont and similar soils

Composition: 5 percent
Landform: Undulating, old colluvial fans and backslopes and footslopes on mountains

Weverton and similar soils

Composition: 4 percent
Landform: Backslopes and footslopes on mountains

Unnamed soils

Composition: 1 percent
Landform: Drainageways

These are poorly drained hydric soils along the center of drainageways.

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

AmD—Airmont cobbly loam, 8 to 25 percent slopes, extremely stony

Map Unit Setting

Landscape: Mountains
Note: Some areas in the unit have a rubbly surface phase. Some small areas of poorly drained soils are along drainageways.

Component Description

Airmont and similar soils

Composition: 85 percent
Landform: Drainageways on mountains
Slope: 8 to 25 percent
Texture of the surface layer: Cobbly loam
Depth to a restrictive feature: 24 to 40 inches to a fragipan
Drainage class: Moderately well drained
Parent material: Gravelly colluvium derived from quartzite
Flooding: None
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 4.0 inches
Note: The fragipan is weakly expressed in places.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Deposit and similar soils

Composition: 5 percent
Landform: Flood plain and narrow, high-gradient flood plains

Thurmont and similar soils

Composition: 5 percent
Landform: Undulating, old colluvial fans and backslopes and footslopes on mountains

Weverton and similar soils

Composition: 4 percent
Landform: Backslopes and footslopes on mountains

Unnamed soils

Composition: 1 percent
Landform: Drainageways
Note: The fragipan is weakly expressed in places.

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Andover Series

The Andover series consists of very deep, poorly drained soils. Permeability is slow. These soils formed in acid colluvium derived from sandstone and shale. They are on concave footslopes and in swales along the base of prominent ridges. Slopes range from 0 to 8 percent.

Andover soils are similar to Brinkerton soils and are mapped adjacent to Berks, Buchanan, Calvin, Clearbrook, Klinesville, Sideling, and Weikert soils. Brinkerton soils formed in colluvium derived from shale. They have a silty subsoil. Berks, Calvin, Clearbrook, Klinesville, and Weikert soils are on surrounding uplands. These soils formed in acid olive and red shale. Buchanan and Sideling soils are on the higher landscapes. They are moderately well drained.

Typical pedon of Andover loam, in an area of Andover-Buchanan loams, 0 to 8 percent slopes, very stony, in Indian Springs Wildlife Management Area, Rattle Run Valley, about 1,300 feet northeast of old hunting cabin and 2,500 feet west of Hanging Rock Road; lat. 39 degrees 24 minutes 42 seconds N. and long. 77 degrees 59 minutes 8 seconds W.

Oi—0 to 2 inches; leave and twig matter.
Oe—2 to 4 inches; black (N 2/0) decomposed leaves and twigs; many fine and very fine and many fine

roots throughout; 1 percent stones; extremely acid; gradual wavy boundary.

A—4 to 6 inches; very dark gray (10YR 3/1) loam; weak fine subangular blocky structure; friable; many fine and very fine and common coarse and medium roots throughout; many fine and medium distinct grayish brown (10YR 5/2) iron depletions; common coarse dark brown (7.5YR 3/4) iron concentrations; 1 percent stones; very strongly acid; clear wavy boundary.

Eg—6 to 11 inches; grayish brown (2.5Y 5/2) gravelly silt loam; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; many fine and medium roots throughout; many fine and very fine and many medium tubular pores; common fine and medium prominent yellowish brown (10YR 5/8) iron accumulations in the lower part of the horizon; common medium prominent continuous dark grayish brown (10YR 4/2) organic films on faces of peds; 1 percent stones, 5 percent cobbles, and 10 percent gravel; very strongly acid; clear wavy boundary.

Btg—11 to 26 inches; light brownish gray (2.5Y 6/2) gravelly loam; moderate coarse prismatic structure parting to moderate medium subangular blocky; prisms are about 6 to 10 inches apart; friable; many fine and medium roots throughout; many fine tubular pores and common fine and few medium vesicular pores; common fine and medium prominent dark grayish brown (10YR 4/2) organic films in pores and on faces of peds; common fine and medium prominent brownish yellow (10YR 6/8) iron accumulations; 20 percent gravel and 5 percent cobbles; very strongly acid; clear wavy boundary.

Bxg—26 to 35 inches; 40 percent gray (10YR 5/1) and 30 percent light yellowish brown (2.5Y 6/4) gravelly clay loam; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm; many fine tubular pores; common fine and medium prominent brownish yellow (10YR 6/8) iron accumulations on faces of peds; common medium prominent discontinuous brown (7.5YR 5/2) organic films on faces of peds; 20 percent gravel and 5 percent cobbles; very strongly acid; clear wavy boundary.

Bx—35 to 44 inches; yellowish brown (10YR 5/6); gravelly clay loam; weak coarse prismatic structure parting to weak medium subangular blocky; firm; common fine roots throughout; common medium distinct grayish brown (10YR 4/2) organic films on faces of peds; common medium distinct gray (10YR 6/1) iron depletions; 20 percent gravel, 5 percent cobbles, and 1 percent stones; very strongly acid; gradual wavy boundary.

C—44 to 72 inches; yellowish brown (10YR 5/4) cobbly clay loam; massive; friable; common fine roots throughout; common coarse distinct gray (10YR 6/1) iron depletions; 15 percent gravel and 10 percent cobbles; very strongly acid.

The solum ranges from 40 to 60 inches. Depth to fragipan ranges from 20 to 28 inches. Depth to bedrock is more than 5 feet. Subrounded and subangular sandstone fragments range from 1 to 20 inches across. Rock fragments range from 0 to 35 percent in the B horizon and from 10 to 40 percent in the C horizon. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 to 4. Texture of the fine earth fraction is silt loam, loam, or sandy loam.

The E horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. Texture of the fine earth fraction is silt loam, loam, or sandy loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. Texture of the fine earth fraction is loam, clay loam, or sandy clay loam.

The Bx horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 to 6. Texture of the fine earth fraction is loam, clay loam, or sandy clay loam.

The C horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 1 to 4. Texture of the fine earth fraction is sandy loam, sandy clay loam, clay loam, or loam.

AnB—Andover-Buchanan loams, 0 to 8 percent slopes, very stony

Map Unit Setting

Landscape: Valleys
Note: Some areas in this map unit have an extremely stony surface.

Component Description

Andover and similar soils

Composition: 45 percent
Landform: Concave footslopes, toeslopes, and drainageways
Slope: 0 to 8 percent
Texture of the surface layer: Loam
Depth to a restrictive feature: 20 to 28 inches to a fragipan
Drainage class: Poorly drained

Parent material: Loamy colluvium derived from sandstone and siltstone or from sandstone and shale
Flooding: None
Water table: 0.0 to 0.5 feet
Available water capacity: Average of 5.5 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Buchanan and similar soils

Composition: 40 percent
Landform: Concave footslopes, toeslopes, and drainageways
Slope: 0 to 8 percent
Texture of the surface layer: Loam
Depth to a restrictive feature: Fragipan at a depth of 25 to 30 inches
Drainage class: Somewhat poorly drained
Parent material: Loamy colluvium derived from sandstone and siltstone or from sandstone and shale
Flooding: None
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 6.4 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Berks and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Calvin and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Hazleton and similar soils

Composition: 5 percent
Landform: Shoulders and backslopes of mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Atkins Series

The Atkins series consists of very deep, poorly drained soils. Permeability is slow to moderate. These soils formed in acid alluvium washed from upland soils that formed in shale and sandstone. They are on flood plains along streams. Slopes range from 0 to 3 percent.

Atkins soils are similar to Basher, Philo, and Pope soils, and are mapped adjacent to Downsville, Monongahela, and Tyler soils. Basher and Philo soils are moderately well drained. Pope soils are well drained. Basher, Philo, and Pope soils are on flood plains. Downsville, Monongahela, and Tyler soils are on the higher stream terraces, show more development than Atkins soils, and are not subject to flooding.

Typical pedon of Atkins silt loam, 50 feet west of McCoys Ferry Road, and 0.5 mile south of intersection of Greenspring Furnace Road and McCoys Ferry Road near McCoys Ferry; lat. 39 degrees 36 minutes 55 seconds and long. 77 degrees 58 minutes 23 seconds.

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium granular structure; friable; many fine and medium and few coarse roots; moderately acid or slightly acid; clear smooth boundary.

Bg—6 to 16 inches; dark grayish brown (2.5Y 4/2) silty clay loam; many medium prominent dark brown (7.5YR 4/4) mottles; weak coarse platy structure parting to moderate medium subangular blocky; firm; common fine roots in upper part of the horizon; strongly acid; clear smooth boundary.

Cg—16 to 36 inches; grayish brown (2.5Y 5/2) gravelly fine sandy clay loam; many medium distinct dark gray (10YR 4/4) and many medium prominent reddish brown (5YR 4/4) mottles; weak coarse platy structure; few fine roots; 25 percent gravel; very strongly acid.

The solum is 25 to 50 inches thick. Depth to bedrock is more than 60 inches. Rock fragments range from 0 to 20 percent in the solum and from 0 to 60 percent in the substratum. In unlimed areas these soils are strongly acid or very strongly acid and range to moderately acid below a depth of 40 inches.

The A or Ap horizon has a hue of 10YR, value of 4 to 7, and chroma of 1 to 4. Texture of the fine earth fraction is dominantly silt loam, but the range includes fine sandy loam, loam, and silty clay loam.

The B horizon is neutral or has hue of 7.5YR to 5Y, value of 4 to 7, and chroma of 0 to 2. Texture of the fine earth fraction is dominantly silty clay loam, but the range includes sandy loam, loam, and silt loam.

The C horizon is neutral or has hue of 7.5YR to 5Y, value of 4 to 7, and chroma of 0 to 8. Texture of the fine earth fraction is stratified silty clay loam, silt loam, loam, or sandy loam. Some pedons have a 2C horizon of sand and gravel below a depth of 3 feet.

At—Atkins silt loam

Map Unit Setting

Landscape: River valleys
Note: Water ponds in depressions for long durations.

Component Description

Atkins and similar soils

Composition: 85 percent
Landform: Flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Drainage class: Poorly drained
Parent material: Loamy alluvium derived from sandstone and siltstone or from sandstone and shale
Flooding: Frequent
Water table: 0.0 to 1.0 feet
Available water capacity: Average of 6.0 inches
Note: In some areas along Licking Creek pH is higher than the range for the Atkins series.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Basher and similar soils

Composition: 5 percent
Landform: Flood plains

Philo and similar soils

Composition: 5 percent
Landform: Flood plains

Pope and similar soils

Composition: 5 percent
Landform: Flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Bagtown Series

The Bagtown series consists of very deep, well drained soils. Permeability is moderately slow or slow. These soils formed in colluvium on backslopes, footslopes, colluvial fans, and benches of mountains. Slopes range from 3 to 45 percent.

Bagtown soils are similar to Thurmont soils and are mapped adjacent to Airmont, Braddock, Dekalb, Trego, and Weverton soils. Thurmont soils formed in colluvium similar to that in which Bagtown soils formed, but are not as deep as Bagtown soils. Thurmont soils have contrasting materials between depths of 30 and 60 inches and are well drained. Airmont soils have a fragipan, contain more than 35 percent rock fragments throughout, and are in concave positions along streams. Braddock soils are on the lower colluvial fans, are much redder than Bagtown soils, and average more than 35 percent clay throughout. Dekalb soils are on ridgetops, formed residuum derived from quartzite, and have bedrock at a depth of 20 to 40 inches. Trego soils are on lower, concave, colluvial footslopes and on old, alluvial fans. Trego soils are moderately well drained and have a fragipan. Weverton soils formed in colluvium derived from quartzite over residuum derived from phyllite. They are well drained.

Typical pedon of Bagtown cobbly loam, 15 to 25 percent slopes, extremely stony, about 0.8 mile east of Crystal Falls Road; 600 feet north of intersection of Mount Aetna and Crystal Falls Roads; lat. 39 degrees 35 minutes 56 seconds N. and long. 77 degrees 35 minutes 13 seconds W.

Oi—0 to 3 inches; leaves and twigs; 2 percent stone cover.

A—3 to 8 inches; very dark brown (7.5YR 2.5/2) cobbly loam; weak fine subangular blocky structure parting to weak fine granular; very friable; many fine, common medium, and few coarse roots; few fine vesicular pores; 6 percent gravel, 15 percent cobble, and 4 percent stones; very strongly acid; clear wavy boundary.

BE—8 to 15 inches; light yellowish brown (10YR 6/4) gravelly loam; weak medium subangular blocky structure; very friable; many fine and common medium roots; many fine tubular pores and few medium tubular and vesicular pores; 15 percent gravel and 1 percent stones; very strongly acid; clear wavy boundary.

Bt1—15 to 31 inches; strong brown (7.5YR 4/6) gravelly loam; moderate medium subangular blocky structure; friable; common fine and few medium roots; common fine tubular pores, common medium vesicular pores, and few medium tubular pores; common faint thin discontinuous clay skins in pores, on faces of peds, and around coarse fragments; 20 percent gravel and 5 percent channers; very strongly acid; clear wavy boundary.

Bt2—31 to 48 inches; yellowish brown (10YR 5/4) gravelly loam (70 percent of the horizon) and brownish yellow (10YR 6/6) gravelly sandy loam (30 percent of the horizon); weak medium subangular blocky structure; friable, firm; few fine roots; common fine tubular pores and few fine vesicular pores in the loam part of the horizon and many fine tubular and vesicular pores and common medium and few coarse vesicular pores in the sandy loam part of the horizon; common faint clay skins; common fine prominent yellowish red (5YR 5/8) and medium distinct strong brown (7.5YR 5/8) iron accumulations; 17 percent gravel; very strongly acid; diffuse wavy boundary.

Bt3—48 to 60 inches; yellowish brown (10YR 5/6) gravelly loam; moderate medium subangular blocky structure; friable; few fine roots; common medium vesicular pores and few medium tubular pores; common distinct clay skins; common fine prominent light yellowish brown (2.5Y 6/3) iron depletions and common fine distinct strong brown (7.5YR 5/6) iron accumulations; few medium distinct iron-manganese stains; 20 percent gravel; very strongly acid; clear wavy boundary.

BC—60 to 73 inches; brownish yellow (10YR 6/6) gravelly loam; many coarse prominent pale yellow (2.5Y 7/4) and many medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine tubular pores and few fine vesicular pores; few fine clay skins in pores; 20 percent gravel, 5 percent cobbles, and 2 percent channers; very strongly acid; clear wavy boundary.

C—73 to 96 inches; brownish yellow (10YR 6/6) very channery loam; many medium clay films; 40 percent channers, 10 percent gravel, and 5 percent cobbles; very strongly acid.

R—96 inches; indurated quartzite of the Weverton Formation; very strongly acid.

The solum ranges from 50 to 65 inches. Gravel, cobbles, stones, and channers make up 15 to 45 percent of the surface layer and the subsoil and 15 to 50 percent of the substratum. In unlimed areas reaction is strongly acid or very strongly acid.

The A horizon has hue of 10YR to 7.5YR, value of 3 to 4, and chroma of 1 to 6. Texture of the fine earth fraction is silt loam, loam, or sandy loam.

The BE horizon has hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Texture of the fine earth fraction is silt loam, loam, or sandy loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture of in the fine earth fraction is loam, clay loam, sandy loam, or sandy clay loam. This pedon exhibited weak fragic characteristics.

The C horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture of the fine earth fraction is loam, sandy loam, or clay loam.

Rock is variegated. It has hue of 2.5YR, 5YR, 10YR, and 2.5Y.

BaB—Bagtown cobbly loam, 3 to 8 percent slopes, extremely stony

Map Unit Setting

Landscape: Mountains
Note: Some areas in the map unit are stony or very stony. Some small areas of hydric soils are along intermittent drainageways.

Component Description

Bagtown and similar soils

Composition: 85 percent
Landform: Backslopes and footslopes of mountains
Slope: 3 to 8 percent
Texture of the surface layer: Cobbly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of more than 72 inches
Drainage class: Well drained
Parent material: Loamy colluvium derived from quartzite or sandstone
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 13.3 inches
Note: These soils exhibit weak fragic properties. In places some horizons are more than 35 percent rock fragments.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Thurmont and similar soils

Composition: 5 percent
Landform: Undulating, old colluvial fans, backslopes, and footslopes of mountains

Weverton and similar soils

Composition: 5 percent
Landform: Backslopes and footslopes of mountains

Braddock and similar soils

Composition: 4 percent
Landform: Convex footslopes and toeslopes

Unnamed soils

Composition: 1 percent
Landform: Drainageways
Note: These poorly drained soils are along intermittent drainageways.

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BaC—Bagtown cobbly loam, 8 to 15 percent slopes, extremely stony

Map Unit Setting

Landscape: Mountains (fig. 16)
Note: Some areas in this map unit are stony or very stony. Some small areas of hydric soils are along intermittent drainageways.

Component Description

Bagtown and similar soils

Composition: 85 percent
Landform: Backslopes and footslopes of mountains
Slope: 8 to 15 percent
Texture of the surface layer: Cobbly loam
Depth to a restrictive feature: Bedrock (lithic) is at a depth of more than 72 inches
Drainage class: Well drained
Parent material: Loamy colluvium derived from quartzite or sandstone
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 13.3 inches
Note: These soils exhibit weak fragic properties. In places some horizons are more than 35 percent rock fragments.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Thurmont and similar soils
Composition: 5 percent
Landform: Undulating old colluvial fans and backslopes and footslopes on mountains

Weverton and similar soils

Composition: 5 percent
Landform: Backslopes and footslopes on mountains

Braddock and similar soils

Composition: 4 percent
Landform: Undulating, old colluvial fans

Unnamed soils

Composition: 1 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BaD—Bagtown cobbly loam, 15 to 25 percent slopes, extremely stony

Map Unit Setting

Landscape: Mountains
Note: Some areas in the map unit are very stony. Some small areas of hydric soils are along intermittent drainageways.

Component Description

Bagtown and similar soils

Composition: 85 percent
Landform: Backslopes and footslopes on mountains
Slope: 15 to 25 percent
Texture of the surface layer: Cobbly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of more than 72 inches
Drainage class: Well drained
Parent material: Loamy colluvium derived from sandstone or quartzite
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 5.3 inches
Note: These soils exhibit weak fragic properties. In places some horizons are more than 35 percent rock fragments.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Dekalb and similar soils

Composition: 5 percent

Figure 16.—Typical landscape of Bagtown cobbly loam, 8 to 15 percent slopes, extremely stony, on the foot slopes of South Mountain. In spite of stones and boulders, this soil is well suited to orchards.

Landform: Mountain summits and treads and risers on backslopes

Weverton and similar soils

Composition: 5 percent
Landform: Backslopes and footslopes on mountains.

Braddock and similar soils

Composition: 4 percent
Landform: Undulating, old colluvial fans

Unnamed soils

Composition: 1 percent
Landform: Drainageways
Note: These are poorly drained soils along intermittent drainageways.

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BbD—Bagtown cobbly loam, 15 to 25 percent slopes, rubbly

Map Unit Setting

Landscape: Mountains
Note: Generally, this soil is in narrow areas below complexes that have rock outcrops.

Component Description

Bagtown and similar soils

Composition: 85 percent
Landform: Backslopes and footslopes on mountains
Slope: 15 to 25 percent
Texture of the surface layer: Cobbly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of more than 72 inches
Drainage class: Well drained
Parent material: Loamy colluvium derived from quartzite and sandstone
Flooding: None
Water table: 4.0 to 6.0 feet
Available water capacity: Average of 5.3 inches

Note: These soils exhibit weak, fragic properties. In places some layers are more than 35 percent rock fragments.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Dekalb and similar soils

Composition: 5 percent
Landform: Mountain summits, and treads and risers on backslopes

Thurmont and similar soils

Composition: 5 percent
Landform: Undulating, old colluvial fans and backslopes and footslopes of mountains

Weverton and similar soils

Composition: 4 percent
Landform: Backslopes and footslopes on mountains

Unnamed soils

Composition: 1 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BbE—Bagtown cobbly loam, 25 to 45 percent slopes, rubbly

Map Unit Setting

Landscape: Mountains
Note: This map unit has small amounts of rock outcrop. Also, in places, bedrock is at a depth of less than 72 inches.

Component Description

Bagtown and similar soils

Composition: 85 percent
Landform: Mountain summits, and treads and risers on backslopes
Slope: 25 to 45 percent
Texture of the surface layer: Cobbly loam
Depth to a restrictive feature: Bedrock (lithic) is at a depth of more than 72 inches
Drainage class: Well drained
Parent material: Loamy colluvium derived from sandstone or quartzite
Flooding: None
Water table: 4.0 to 6.0 feet
Available water capacity: Average of 5.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Dekalb and similar soils

Composition: 10 percent
Landform: Mountain summits, and treads and risers on backslopes

Weverton and similar soils

Composition: 5 percent
Landform: Backslopes and footslopes on mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Basher Series

The Basher series consists of very deep, moderately well drained soils. Permeability is moderate in the surface layer and subsoil and moderate or moderately slow in the lower part of the substratum. These soils formed in recent alluvial deposits eroded from red, acid sandstone and shale. They are on flood plains along streams. Slopes range from 0 to 3 percent.

Basher soils are similar to Philo soils and are mapped adjacent to Atkins, Bigpool, Deposit, and Pope soils. Philo soils formed in alluvium derived from acid brown and gray shale and sandstone. Atkins soils are poorly drained and have a browner solum than Basher soils. Bigpool soils are on higher flood plains mostly along the Potomac River. They are more well developed than Basher soils. Deposit soils have more gravel throughout than Basher soils. They are yellowish brown. Pope soils are well drained. They formed in alluvium derived from acid, brown and gray sandstone and shale.

Typical pedon of Basher fine sandy loam, in a nearly level hayfield along Ditch Run, about 2,500 feet south of intersection of Mason-Dixon line and Timber Ridge Road, 2,000 feet west of Timber Ridge Road; near

Hancock; lat. 39 degrees 42 minutes 57 seconds N. and long. 78 degrees 7 minutes 38 seconds W.

Ap1—0 to 4 inches; brown (7.5YR 4/3) fine sandy loam; weak fine granular structure; very friable; many fine and common medium roots; moderately acid or slightly acid; abrupt smooth boundary.

Ap2—4 to 10 inches; brown (7.5YR 4/4) fine sandy loam; weak coarse subangular blocky structure; very friable; many fine and common medium roots; common fine tubular pores; slightly alkaline; abrupt smooth boundary.

Bw1—10 to 20 inches; reddish brown (5YR 4/3) fine sandy loam; medium discontinuous bands of loamy fine sand 1 to 2 inches thick; weak medium subangular blocky structure; friable; many fine roots; common fine tubular pores; many fine and medium very dark gray (5YR 3/1) manganese stains; 5 percent red shale channers; slightly alkaline; gradual wavy boundary.

Bw2—20 to 31 inches; reddish brown (5YR 4/4) fine sandy loam; weak medium subangular blocky structure; very friable; common fine roots; common fine tubular pores; few fine distinct brown (7.5YR 5/2) and common fine distinct very dark gray (10YR 3/1) iron depletions; neutral; clear smooth boundary.

C1—31 to 48 inches; reddish brown (5YR 4/4) loamy sand; massive; very friable; common fine roots; common fine tubular pores; slightly acid; clear smooth boundary.

C2—48 to 65 inches; reddish brown (5YR 5/3) sandy clay loam; massive; very friable; many medium prominent yellowish brown (10YR 5/8) iron accumulations; 10 percent gravel; slightly acid.

The solum ranges from 20 to 35 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments range from 0 to 20 percent throughout the solum. In limed areas is neutral to moderately acid. In unlimed areas it ranges from slightly acid to very strongly acid.

The A or Ap horizon has hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 to 4. It is sandy loam, fine sandy loam, loam, or silt loam.

The Bw horizon has hue of 2.5YR to 5YR, value of 3 to 5, and chroma of 3 to 4. In the fine earth fraction it is sandy loam, fine sandy loam, loam, or silt loam.

The C horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 1 to 4. In the fine earth fraction it is loamy sand, sandy loam, sandy clay loam, or loam.

Bc—Basher fine sandy loam

Map Unit Setting

Landscape: River valleys

Component Description

Basher and similar soils

Composition: 80 percent
Landform: Flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Fine sandy loam
Drainage class: Moderately well drained
Parent material: Loamy alluvium derived from sandstone and siltstone or from sandstone and shale
Flooding: Occasional
Water table: 1.5 to 2.0 feet
Available water capacity: Average of 5.1 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Pope and similar soils

Composition: 10 percent
Landform: Flood plains

Atkins and similar soils

Composition: 5 percent
Landform: Depressions
Note: This component is in the poorly drained backwater areas of the map unit.

Deposit and similar soils

Composition: 5 percent
Landform: Flood plains and narrow, high-gradient flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Berks Series

The Berks series consists of moderately deep, well drained soils. Permeability is moderate or moderately rapid. These soils formed in residuum derived from acid shale, siltstone, and sandstone. They are on the summits of highly dissected shale ridges. Slopes range from 0 to 25 percent.

Berks soils are similar to Calvin soils and are mapped adjacent to Brinkerton, Clearbrook, Klinesville, Monongahela, Sideling, and Weikert soils. Calvin soils formed in residuum derived from red shale and fine grained sandstone. Brinkerton and Clearbrook soils are in concave, upland draws; have a seasonal high water table within a depth of 20 inches; and have a dense, slowly permeable subsoil. Klinesville and Weikert soils are shallow to bedrock and typically are on side slopes of shale ridges. Monogahela soils formed in old alluvium on stream terraces, are moderately well drained and slowly permeable, and have a fragipan. Sideling soils formed in sandstone derived from colluvium over residuum derived from shale and are moderately well drained and slowly permeable.

Typical pedon of Berks channery silt loam, 8 to 15 percent slopes, in a southwest-facing, convex, oak-hickory forest, 1,800 feet west of intersection of MD-68 and Sword Road, 1,000 feet north of MD-68; near Pinesburg; lat. 39 degrees 37 minutes 38 seconds N. and long. 77 degrees 50 minutes 51 seconds W.

A—0 to 2 inches; dark yellowish brown (10YR 3/4) channery silt loam; weak fine granular structure; very friable; common fine and medium and few coarse roots; 20 percent shale channers; strongly acid; abrupt smooth boundary.

Bw1—2 to 6 inches; light yellowish brown (10YR 6/4) channery loam; weak fine platy structure; friable; many fine and few medium roots; many fine and medium tubular and vesicular pores; 20 percent shale channers; very strongly acid; clear wavy boundary.

Bw2—6 to 18 inches; yellowish brown (10YR 5/6) very channery silt loam; moderate fine platy structure; friable; few medium and coarse roots; common fine and medium tubular and vesicular pores; few distinct clay skins on rock fragments; 40 percent shale channers; strongly acid; clear wavy boundary.

CB—18 to 24 inches; yellowish brown (10YR 5/6) very channery loam; weak fine platy structure; friable; few medium and coarse roots; few fine medium tubular pores; few distinct clay skins on rock fragments; 55 percent shale channers; strongly acid; clear irregular boundary.

R1—24 to 38 inches; brownish yellow (10YR 6/6) fractured shale; strongly cemented; 90 percent rock fragments, 5 percent silt loam, 3 percent voids.

R2—38 inches; brownish yellow (10YR 6/6) shale; very strongly cemented.

The solum is 12 to 35 inches thick. Depth to bedrock is 20 to 40 inches. Rock fragments range from 10 to 50 percent in the surface layer, from 15 to 75 percent in the B horizon, and from 50 to 90 percent in the C horizon. In unlimed areas reaction is extremely acid to slightly acid.

The Ap or A horizon has hue of 10YR, value of 3 to 5, and chroma of 3 or 4. Texture of the fine earth fraction is loam or silt loam.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. Texture of the fine earth fraction is loam, silt loam, or silty clay loam.

The CB horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. Texture of the fine earth fraction is silt loam or loam.

BeB—Berks channery silt loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Uplands and mountains

Component Description

Berks and similar soils

Composition: 80 percent
Landform: Summits and backslopes of uplands; summits and shoulders of mountains
Slope: 3 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.4 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Brinkerton and similar soils

Composition: 5 percent
Landform: Drainageways

Calvin and similar soils

Composition: 5 percent
Landform: Summits and backslopes of uplands and summits and shoulders of mountains

Clearbrook and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Weikert and similar soils

Composition: 5 percent
Landform: Summits and backslopes of uplands; summits and shoulders of mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BeC—Berks channery silt loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Uplands and mountains

Component Description

Berks and similar soils

Composition: 80 percent
Landform: Summits and backslopes of uplands; summits and shoulders of mountains
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Brinkerton and similar soils

Composition: 5 percent
Landform: Drainageways

Calvin and similar soils

Composition: 5 percent
Landform: Summits and backslopes of uplands; summits and shoulders of mountains

Clearbrook and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Weikert and similar soils

Composition: 5 percent
Landform: Summits and backslopes of uplands

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BfB—Berks-Weikert channery silt loams, 3 to 8 percent slopes

Map Unit Setting

Landscape: Uplands and mountains

Component Description

Berks and similar soils

Composition: 50 percent
Landform: Summits and backslopes of hills; summits and shoulders of mountains
Slope: 3 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Weikert and similar soils

Composition: 35 percent
Landform: Summits and backslopes of uplands; summits and shoulders of mountains
Slope: 3 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone

Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 1.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Brinkerton and similar soils

Composition: 5 percent
Landform: Drainageways

Calvin and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Clearbrook and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BfC—Berks-Weikert channery silt loams, 8 to 15 percent slopes

Map Unit Setting

Landscape: Mountains

Component Description

Berks and similar soils

Composition: 45 percent
Landform: Summits and backslopes of hills; summits and shoulders of mountains
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Weikert and similar soils

Composition: 40 percent
Landform: Summits and backslopes of hills; summits and shoulders of mountains
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 1.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Brinkerton and similar soils

Composition: 5 percent
Landform: Drainageways

Clearbrook and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Klinesville and similar soils

Composition: 5 percent
Landform: Summits and backslopes of hills; summits and shoulders of mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BkB—Berks-Weikert-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

Landscape: Mountains

Component Description

Berks and similar soils

Composition: 35 percent

Landform: Ridges
Slope: 0 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Weikert and similar soils

Composition: 35 percent
Landform: Ridges
Slope: 0 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 1.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Urban land

Composition: 20 percent
Landform: Man-influenced
Slope: 0 to 8 percent
Texture of the surface layer: Concrete or asphalt
Depth to a restrictive feature: Concrete surface
Parent material: Man-influenced
Flooding: None
Water table: 2 feet or more
Available water capacity: None assigned

Additional Components

Brinkerton and similar soils

Composition: 5 percent
Landform: Drainageways

Clearbrook and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BkD—Berks-Weikert-Urban land complex, 8 to 25 percent slopes

Map Unit Setting

Landscape: Mountains

Component Description

Berks and similar soils

Composition: 35 percent
Landform: Summits and backslopes
Slope: 8 to 25 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Weikert and similar soils

Composition: 35 percent
Landform: Summits and backslopes
Slope: 8 to 25 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 1.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is

available in the appropriate table of this publication (see "Summary of Tables").

Urban land

Composition: 20 percent
Landform: Man-influenced
Slope: 8 to 25 percent
Texture of the surface layer: Concrete and asphalt
Depth to a restrictive feature: Concrete surface
Parent material: Man-influenced
Flooding: None
Water table: 2 feet or more
Available water capacity: None assigned

Additional Components

Brinkerton and similar soils

Composition: 5 percent
Landform: Drainageways

Clearbrook and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Bigpool Series

Bigpool series consists of very deep, moderately well drained soils. Permeability is moderately slow or slow. These soils formed in alluvium derived from limestone, sandstone, shale, and quartzite. They are on high flood plains along the Potomac River. Slopes range from 0 to 3 percent.

Bigpool soils are similar to Combs soils and are mapped adjacent to Atkins, Lindside, Melvin, Philo, and Pope soils. Combs soils have a thick, dark brown surface layer and are well drained. Atkins soils are poorly drained and generally have finer textures throughout. Lindside, Philo, and Pope soils are on lower flood plains. They are subject to flooding of greater frequency than Bigpool soils. They have a weakly developed profile. Melvin soils formed in silty alluvium and are poorly drained.

Typical pedon of Bigpool silt loam, on nearly level cropland adjacent to the Potomac River, 3,600 feet south of intersection of Frederick Park Drive and MD-56, 2,000 feet west of Fort Frederick Drive; near Bigpool; lat. 39 degrees 36 minutes 33 seconds N. and long. 78 degrees 0 minutes 42 seconds W.

Ap1—0 to 7 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure parting to weak fine granular; firm; common fine roots; many fine and coarse vesicular pores and many fine tubular pores; slightly acid; clear smooth boundary.

Ap2—7 to 11 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine medium subangular blocky structure; firm; few fine roots; many fine and common coarse tubular pores and common medium vesicular pores; neutral; abrupt wavy boundary.

BE—11 to 21 inches; strong brown (7.5YR 5/6) loam; weak fine subangular blocky structure; friable; common very fine roots; many fine and common medium vesicular pores and many fine and common coarse tubular pores; common coarse distinct dark brown (10YR 3/3) organic stains lining pores and on faces of peds; 1 percent gravel; neutral; clear wavy boundary.

Bt1—21 to 32 inches; strong brown (7.5YR 4/6) sandy clay loam; moderate coarse subangular blocky structure parting to weak medium subangular blocky; few very fine roots; common fine and few coarse tubular pores; common medium faint strong brown (7.5YR 5/8) iron accumulations; common medium distinct light brown (7.5YR 6/3) iron depletions; few fine prominent black (5YR 2.5/1) manganese stains; common distinct discontinuous clay films on faces of peds, on rock fragments, and lining pores; 5 percent gravel; strongly acid; clear wavy boundary.

Bt2—32 to 41 inches; brown (10YR 4/3) gravelly loam; moderate medium subangular blocky structure; friable; many fine and medium tubular pores and common fine vesicular pores; common fine faint brown (7.5YR 5/3) iron depletions; common fine prominent strong brown (7.5YR 5/8) iron accumulations; many medium prominent dark reddish brown (5YR 3/2) iron stains on faces of peds; many distinct clay films on faces of peds and lining pores; 15 percent gravel and 5 percent channers; strongly acid; clear irregular boundary.

C1—41 to 61 inches; dark yellowish brown (10YR 4/4) sandy loam; massive; friable; many fine and common medium tubular pores and common fine vesicular pores; many medium prominent reddish yellow (5YR 6/8) iron accumulations; common medium distinct pinkish gray (7.5YR 6/2) iron depletions; many distinct discontinuous clay films in pores; 5 percent gravel; very strongly acid; clear wavy boundary.

C2—61 to 76 inches; dark yellowish brown (10YR 4/4) gravelly sandy clay loam; massive; friable;

common fine tubular and vesicular pores; common medium distinct strong brown (7.5YR 5/6) iron accumulations; common medium distinct pinkish gray (10YR 6/2) iron depletions; many distinct clay films; 10 percent gravel and 5 percent cobbles; very strongly acid, clear smooth boundary.

C3—76 to 83 inches; dark yellowish brown (10YR 4/4) loamy sand; massive; friable; common fine tubular and few medium vesicular pores; common medium distinct strong brown (7.5YR 5/6) iron accumulations; common medium prominent yellowish red (5YR 5/6) iron accumulations; 10 percent gravel; very strongly acid.

The solum ranges from 30 to 50 inches in thickness. Depth to bedrock is more than 6 feet. Unlimed soils range from very strongly acid to slightly acid throughout. Rock fragments commonly range from 2 to 20 percent, by volume, in the solum, and range to 30 percent in some pedons. They range from 5 to 25 percent in the substratum.

The Ap horizon has hue of 7.5YR or 10YR, value 4 to 6, and chroma 3 or 8. It is silt loam or loam.

The BE horizon has hue of 10YR or 7.5YR, value 4 to 6, and chroma 4 to 6. It is silt loam, loam, or fine sandy loam.

The Bt horizon has hue of 7.5YR to 10YR, value 4 to 6, and chroma 3 to 8. In some pedons it has hue of 5YR. It is silt loam, loam, or sandy clay loam.

The C horizon has hue of 7.5YR to 10YR, value 4 to 6, and chroma 3 to 8. In some pedons it has hue of 5YR. It is sandy loam, fine sandy loam, or loam, but the range includes silt loam or sandy clay loam.

Bp—Bigpool silt loam

Map Unit Setting

Landscape: River valleys
Note: This map unit has small areas of soils that have more than 35 percent rock fragments.

Component Description

Bigpool and similar soils

Composition: 85 percent
Landform: High flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Drainage class: Moderately well drained
Parent material: Loamy alluvium derived from limestone, sandstone, and shale
Flooding: Occasional
Water table: 2.0 to 4.0 feet
Available water capacity: Average of 6.5 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Combs and similar soils

Composition: 5 percent
Landform: Flood plains

Pope and similar soils

Composition: 5 percent
Landform: Flood plains

Melvin and similar soils

Composition: 3 percent
Landform: Flood plains

Atkins and similar soils

Composition: 2 percent
Landform: Flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Braddock Series

The Braddock series consists of very deep, well drained soils. Permeability is moderate. These soils formed in colluvium derived from a mixture of crystalline rock, including quartzite, phyllite, and schist. They are on footslopes of ridges and on colluvial fans. Slopes range from 3 to 25 percent.

Braddock soils are similar to Murrill soils. They are mapped adjacent to Murrill, Bagtown, Dryrun, Duffield, Hagerstown, Ryder, Thurmont, Trego, and Weverton soils. Murrill soils formed in shallower, colluvial deposits over residuum derived from limestone and have less clay throughout than Bigpool soils. Bagtown and Thurmont soils are in higher landscape positions than Braddock soils, contain less clay, and are not as red. Duffield, Hagerstown, and Ryder soils formed in residuum derived from limestone. Dryrun soils are on nearly level, alluvial fans, are moderately well drained, and are more than 35 percent rock fragments, by volume, in the solum. Trego soils are on lower concave foot slopes and old alluvial fans, have a fragipan, and are moderately well drained. Weverton soils are more than 35 percent rock fragments throughout the solum.

Typical pedon of Braddock gravelly loam, in an area of Braddock-Thurmont gravelly loams, 3 to 8 percent slopes, about 1,400 feet west of Crystal Falls Road and 3,400 feet south of Mt. Aetna Road; near Mount Aetna; lat. 39 degrees 35 minutes 24 seconds N. and long. 77 degrees 35 minutes 40 seconds W.

Oi—0 to 2 inches; partly decomposed leaves and twigs.

Ap—2 to 7 inches; very dark grayish brown (10YR 3/2) gravelly loam; weak fine granular structure; very friable; many fine and medium and few coarse roots; 25 percent gravel and 5 percent cobbles; moderately acid; clear wavy boundary.

BE—7 to 13 inches; brown (7.5YR 5/4) gravelly loam; weak fine subangular blocky structure; friable; many fine and common medium and few coarse roots; common fine and medium tubular and vesicular pores; 25 percent gravel; moderately acid; clear wavy boundary.

Bt1—13 to 22 inches; reddish yellow (5YR 6/6) gravelly clay loam; many coarse faint red (2.5YR 4/6) mottles; weak medium subangular blocky structure parting to moderate fine subangular blocky; friable; many fine and common medium roots; many fine and few medium tubular and vesicular pores; many fine discontinuous clay films on faces of peds; 20 percent gravel; strongly acid; gradual wavy boundary.

Bt2—22 to 38 inches; red (2.5YR 4/6) gravelly clay; many fine prominent reddish yellow (7.5YR 7/6) mottles; moderate medium subangular blocky structure parting to strong fine subangular blocky; friable; few fine and medium roots; common fine tubular and vesicular pores; common distinct dark reddish brown (5YR 3/4) clay films on faces of peds and in pores; 15 percent gravel; strongly acid; clear wavy boundary.

Bt3—38 to 54 inches; dark red (2.5YR 3/6) clay; many medium prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; firm; few fine roots; many fine tubular and vesicular pores; many faint dark reddish brown (2.5YR 3/4) clay films in pores and on faces of peds; 10 percent gravel; extremely acid; clear irregular boundary.

BC—54 to 68 inches; red (2.5YR 4/6) clay loam; weak fine subangular blocky structure; firm in place, friable out; few fine roots; common fine vesicular pores and few fine tubular pores; common fine prominent white (10YR 8/2) iron depletions; many medium faint light red (2.5YR 6/6) and common medium prominent yellowish brown (10YR 5/6) mottles; few medium faint dusky red (2.5YR 3/2) iron stains; few faint (2.5YR 3/4) clay films on faces of peds; 5 percent gravel; moderately acid; clear wavy boundary.

C—68 to 72 inches; red (2.5YR 4/6) clay loam; massive; friable; few fine roots; few fine vesicular pores; common medium prominent light gray (10YR 7/2) iron depletions; reddish yellow (7.5YR 6/8) iron accumulations; many medium yellowish brown (10YR 5/8) iron accumulations; 5 percent coarse fragments; extremely acid.

The solum is 40 to 70 inches thick. Depth to bedrock is more than 60 inches. The colluvium ranges from 3 to more than 10 feet thick. Rock fragments range from 5 to 35 percent in the Ap, BE, and the upper part of the Bt horizon and from 0 to 25 percent in the lower part in the C horizon. Rock fragments consist mostly of gravel, cobbles, and stones. In unlimed areas reaction is extremely acid through strongly acid.

The Ap horizon has hue of 7.5YR to 10YR, value of 3 or 4, and chroma of 2 to 4. In the fine earth fraction it is loam.

The BE horizon has hue of 7.5YR to 5YR, value of 4 or 5, and chroma of 4 to 8. In the fine earth fraction it is loam, sandy clay loam, or clay loam.

The Bt horizon has a hue of 2.5YR to 5YR, value of 3 to 5, and chroma of 6 to 8. In the fine earth fraction it is clay loam, silty clay loam, or clay.

The BC and C horizons have hue of 10R to 7.5YR, value of 3 to 5, and chroma of 6 to 8. In the fine earth fraction it is clay loam, silty clay loam, or clay.

BrB—Braddock-Thurmont gravelly loams, 3 to 8 percent slopes

Map Unit Setting

Landscape: Valleys
Note: Depressions, where water sometimes ponds, make up about 5 percent of the map unit.

Component Description

Braddock and similar soils

Composition: 45 percent
Landform: Convex footslopes and toeslopes
Slope: 3 to 8 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Clayey colluvium derived from quartzite
Flooding: None
Water table: 4 to 5 feet
Available water capacity: Average of 9.6 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Thurmont and similar soils

Composition: 40 percent
Landform: Undulating, old colluvial fans
Slope: 3 to 8 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Clayey colluvium derived from quartzite
Flooding: None
Water table: 4.0 to 6.0 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Talladega and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Trego and similar soils

Composition: 5 percent
Landform: Alluvial fans and stream terraces

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BrC—Braddock-Thurmont gravelly loams, 8 to 15 percent slopes

Map Unit Setting

Landscape: Valleys
Note: Depressions, where water sometimes ponds, make up about 5 percent of the map unit.

Component Description

Braddock and similar soils

Composition: 45 percent
Landform: Convex footslopes and toeslopes
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Clayey colluvium derived from quartzite
Flooding: None
Water table: 4.0 to 5.0 feet
Available water capacity: Average of 9.6 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Thurmont and similar soils

Composition: 40 percent
Landform: Undulating, old colluvial fans
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Clayey colluvium derived from quartzite
Flooding: None
Water table: 4.0 to 6.0 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Trego

Composition: 10 percent
Landform: Alluvial fans and stream terraces

Talladega and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BrD—Braddock-Thurmont gravelly loams, 15 to 25 percent slopes

Map Unit Setting

Landscape: Valleys
Note: Depressions, which may pond water, make up about 5 percent of the map unit.

Component Description

Braddock and similar soils

Composition: 45 percent
Landform: Convex footslopes and toeslopes

Slope: 15 to 25 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Clayey colluvium derived from quartzite
Flooding: None
Water table: 4.0 to 5.0 feet
Available water capacity: Average of 9.6 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Thurmont and similar soils

Composition: 40 percent
Landform: Undulating, old colluvial fans
Slope: 15 to 25 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Clayey colluvium derived from quartzite
Flooding: None
Water table: 4.0 to 6.0 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Talladega and similar soils

Composition: 7 percent
Landform: Summits and backslopes

Unnamed Soils

Composition: 5 percent
Landform: Drainageways

Trego and similar soils

Composition: 3 percent
Landform: Alluvial fans and stream terraces

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Brinkerton Series

The Brinkerton series consists of very deep, poorly drained soils. Permeability is slow. These soils formed in colluvium derived from acid, grayish brown shale and siltstone. They are on upland footslopes and on head slopes along drainageways. Slopes range from 0 to 8 percent.

Brinkerton soils are similar to Andover soils and are mapped adjacent to Berks, Calvin, Clearbrook, Klinesville, and Weikert soils. Andover soils have greater influence from colluvium derived from sandstone and have more rock fragments throughout than Brinkerton soils. Berks, Calvin, Klinesville, and Weikert soils are on surrounding convex uplands, formed in residuum from acid olive and red shale, and are well drained. Clearbrook soils are somewhat poorly drained, contain more rock fragments, are moderately deep to bedrock, and are in swales on uplands.

Typical pedon of Brinkerton silt loam, 0 to 8 percent slopes, on concave cropland, about 0.75 mile north of Hanging Rock Road and 1,000 feet west of Blairs Valley Road; in the Indian Springs Wildlife Management Area; lat. 39 degrees 42 minutes 21 seconds N. and long. 77 degrees 56 minutes 42 seconds W.

Ap1—0 to 6 inches; brown (10YR 5/3) silt loam; weak coarse subangular blocky structure parting to moderate fine granular; friable; many fine and medium roots; common medium tubular and vesicular pores and many fine tubular pores; common fine prominent reddish yellow (7.5YR 6/8) iron concentrations; 5 percent shale channers; moderately acid; clear smooth boundary.

Ap2—6 to 11 inches; brown (10YR 5/3) silt loam; weak coarse subangular blocky structure parting to moderate fine subangular blocky; friable; many fine and medium roots; many fine and medium tubular pores, and common fine vesicular pores; common fine prominent reddish yellow (7.5YR 6/8) iron concentrations; 5 percent shale channers; moderately acid; abrupt smooth boundary.

Btg—11 to 23 inches; light grayish brown (2.5Y 6/2) silty clay loam; strong coarse prismatic structure parting to strong medium angular blocky; firm; many fine and common medium roots; many fine tubular and vesicular pores and common medium and few coarse tubular pores; many fine faint light olive brown (2.5Y 5/3) organic coats on faces of peds and in pores; many medium prominent yellowish brown (10YR 5/6) iron concentrations; 5 percent shale channers; slightly acid; gradual smooth boundary.

Btxg—23 to 35 inches; gray (10YR 6/1) silty clay loam; very strong coarse prismatic structure parting to strong medium angular blocky parting to strong fine angular blocky; firm; many fine and very fine roots in cracks and on faces of peds; many fine tubular and vesicular pores; many medium prominent strong brown (7.5YR 5/8) iron concentrations; many fine and medium light yellowish brown (2.5Y 6/4) clay films on faces of peds; 5 percent shale channers; moderately acid; gradual smooth boundary.

C1—35 to 59 inches; yellowish brown (10YR 5/4) very channery silty clay loam; common medium prominent yellowish brown (2.5Y 6/3) mottles; weak fine platy structure derived from the underlying bedrock; friable; many fine prominent black (5YR 2/1) manganese concretions; many medium distinct light gray (10YR 7/2) iron depletions; common fine prominent strong brown (7.5YR 4/6) soft masses of iron accumulation; 45 percent shale channers and 10 percent sandstone gravel; strongly acid, clear wavy boundary.

C2—59 to 72 inches; yellowish brown (10YR 5/4) extremely channery silty clay loam; massive; friable; many fine prominent black (5YR 2/1) manganese concretions; many medium distinct light brownish gray (10YR 6/2) iron depletions; 65 percent shale channers and 10 percent sandstone gravel; strongly acid, clear wavy boundary.

The solum ranges from 35 to 50 inches in thickness. Depth to bedrock is more than 60 inches. Depth to the fragipan ranges from 15 to 30 inches. Rock fragments range from 0 to 10 percent above the fragipan, from 0 to 25 percent in the fragipan, and from 10 to 75 percent in the C horizon. Reaction is very strongly acid to moderately acid in the solum and ranges from strongly acid to slightly acid in the C horizon.

The A horizon has hue of 10YR to 2.5Y, value of 3 to 6, and chroma of 1 to 3. In the fine earth fraction it is silt loam or silty clay loam.

The Btg horizon is neutral or has a hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. In the fine earth fraction it is silt loam, silty clay loam, or clay.

The Btx horizon is neutral or has hue of 10YR to 2.5Y, value of 5 or 6, and chroma of 1 to 3. In the fine earth fraction it is silt loam, loam, clay loam, or silty clay loam.

The C horizon is neutral or has hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 0 to 4. In the fine earth fraction it is silt loam, loam, or silty clay loam.

BtB—Brinkerton silt loam, 0 to 8 percent slopes

Map Unit Setting

Landscape: Valleys
Note: Water sometimes ponds in concave landscape positions.

Component Description

Brinkerton and similar soils

Composition: 80 percent
Landform: Drainageways
Slope: 0 to 8 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Fragipan at a depth of 20 to 40 inches
Drainage class: Poorly drained
Parent material: Silty colluvium derived from shale and siltstone
Flooding: None
Water table: 0.0 to 0.5 feet
Available water capacity: Average of 7.1 inches
Note: The fragipan is weakly expressed in some places.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Berks and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Clearbrook and similar soils

Composition: 10 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Buchanan Series

The Buchanan series consists of very deep, somewhat poorly drained soils. Permeability is slow. These soils formed in colluvium derived from acid sandstone and shale on mountains. They are on footslopes, backslopes, and fans below ridges capped by sandstone in the western part of Washington County. Slope ranges from 0 to 25 percent.

Buchanan soils are similar to Sideling soils and are mapped adjacent to Berks, Brinkerton, Calvin, Hazleton, Klinesville, and Weikert soils. Sideling soils are in higher landscape positions than Buchanan soils, have a clayey subsoil, and do not have a fragipan. Berks, Calvin, Klinesville, and Weikert soils are shallower to bedrock than Buchanan soils, formed in residuum derived from acid shale on the surrounding uplands, are well drained, and have moderately rapid permeability. Hazleton soils are well drained and have more rock fragments in the solum and have less clay than Buchanan soils.

Typical pedon of Buchanan gravelly loam, 3 to 8 percent slopes, on a southeast-facing, concave landscape, in an oak-hickory forest, about 2,000 feet north of intersection of Broadfording Road and Draper Road, 500 feet west of Draper Road; near Clearspring; lat. 39 degrees 39 minutes 41 seconds N. and long. 77 degrees 56 minutes 23 seconds W.

Oi—0 to 2 inches; partly decomposed leaves, twigs, and roots.

A—2 to 7 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak fine granular structure; very friable; many fine and medium roots; few fine tubular pores; 15 percent gravel and 10 percent cobbles; strongly acid; abrupt wavy boundary.

BE—7 to 15 inches; brownish yellow (10YR 6/6) gravelly loam; weak fine and medium subangular blocky structure; friable; many fine and medium and few coarse roots; common medium and few coarse tubular pores; few faint discontinuous clay films on faces of peds and on rock fragments; 15 percent gravel; strongly acid; clear wavy boundary.

Bt1—15 to 25 inches; brownish yellow (10YR 6/6) gravelly loam; moderate medium subangular structure; friable; common medium and few coarse roots; few fine and common medium tubular and vesicular pores; common medium distinct grayish brown (10YR 5/2) iron depletions; common discontinuous clay films on faces of peds, on rock fragments, and lining pores; 15 percent gravel; strongly acid; clear wavy boundary.

Btx1—25 to 36 inches; strong brown (7.5YR 5/6) loam; weak coarse prismatic structure parting to strong medium subangular blocky; firm; many fine vesicular pores and few fine tubular pores; many medium prominent light gray (2.5Y 7/2) iron depletions on faces of prisms; common medium dusky red (2.5YR 3/2) iron accumulations; common discontinuous clay films on faces of peds and lining pores; 5 percent gravel; strongly acid; clear wavy boundary.

Btx2—36 to 51 inches; strong brown (7.5YR 5/6) loam; moderate coarse prismatic structure parting to moderate medium platy; firm; few fine and medium roots confined to prism faces; common fine and medium vesicular pores; many coarse distinct light gray (10YR 7/2) iron depletions on faces of prisms; common medium prominent dusky red (2.5YR 3/2) iron accumulations; many discontinuous clay films on faces of peds and lining pores; 5 percent gravel; strongly acid; clear wavy boundary.

Btx3—51 to 66 inches; yellowish brown (10YR 5/6) loam; weak coarse prismatic structure parting to moderate thin platy; very firm; few fine and medium roots confined to prism faces; common fine and medium vesicular pores; many medium and coarse distinct light gray (10YR 7/2) iron depletions on faces of prisms; common medium distinct strong brown (7.5YR 4/6) iron accumulations; many discontinuous clay films on faces of peds and lining pores; 10 percent gravel; strongly acid.

The solum ranges from 40 to 70 inches in thickness. Depth to hard bedrock ranges from 5 to 10 feet or more. Depth to a fragipan ranges from 20 to 36 inches. Fragments of sandstone and shale range from 0 to 30 percent above the fragipan, from 5 to 25 percent in the fragipan, and from 5 to 60 percent below the fragipan and in the substratum. Typically, they are gravel, channers, cobbles, and stones. In unlimed areas soil reaction ranges from extremely acid to strongly acid.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 6, and chroma of 3 or 4. In the fine earth fraction it is silt loam, loam, or fine sandy loam.

The BE horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma 5 to 8. In the fine earth fraction it is silt loam or loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 6. Iron depletions are common in this horizon. In the fine earth fraction the horizon is silt loam, loam, clay loam, or sandy clay loam.

The Btx horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 3 to 6. It has weak or moderate prismatic structure and is firm or very firm. In the fine earth fraction it is silt loam, loam, clay loam, or sandy clay loam.

The C horizon, where it occurs, has hue of 10YR to 5YR, value 5 or 6, and of chroma 4 to 6. In the fine earth fraction it is silt loam, loam, sandy loam, sandy clay loam, clay loam, or clay.

BuB—Buchanan gravelly loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Valleys
Note: In some areas the surface is stony or very stony.

Component Description

Buchanan and similar soils

Composition: 85 percent

Landform: Concave footslopes, toeslopes, and drainageways
Slope: 3 to 8 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Fragipan at a depth of 25 to 30 inches
Drainage class: Somewhat poorly drained
Parent material: Loamy colluvium derived from sandstone and shale or from sandstone and siltstone
Flooding: None
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 6.5 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Andover and similar soils

Composition: 5 percent
Landform: Drainageways

Berks and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Brinkerton and similar soils

Composition: 5 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BuC—Buchanan gravelly loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Valleys
Note: In some areas the surface is stony or very stony.

Component Description

Buchanan and similar soils

Composition: 85 percent
Landform: Concave footslopes, toeslopes, and drainageways
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Fragipan at a depth of 25 to 30 inches
Drainage class: Somewhat poorly drained
Parent material: Loamy colluvium derived from sandstone and either siltstone or shale
Flooding: None
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 6.5 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Andover and similar soils

Composition: 5 percent
Landform: Drainageways

Berks and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Brinkerton and similar soils

Composition: 5 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BuD—Buchanan gravelly loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: Valleys
Note: In some areas the surface is stony or very stony.

Component Description

Buchanan and similar soils

Composition: 85 percent
Landform: Concave footslopes, toeslopes, and drainageways
Slope: 15 to 25 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Fragipan at a depth of 25 to 30 inches
Drainage class: Somewhat poorly drained
Parent material: Loamy colluvium derived from sandstone and shale and from sandstone and siltstone
Flooding: None
Water table: 1.5 to 3.0 feet

Available water capacity: Average of 5.8 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Andover and similar soils

Composition: 5 percent
Landform: Drainageways

Berks and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Hazleton and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Calvin Series

Calvin series consists of moderately deep, well drained soils. Permeability is moderately rapid. These soils formed in residuum derived from acid, red shale, siltstone, and sandstone. They are on highly dissected uplands in the western part of the county. Slopes range from 3 to 65 percent.

Calvin soils are similar to Berks soils and are mapped adjacent to Buchanan, Clearbrook, Klinesville, Sideling, and Weikert soils. Berks soils formed in brown and olive shale and have a yellow subsoil. Weikert and Klinesville soils are shallow to shale bedrock. Buchanan and Sideling soils formed in colluvium derived from sandstone. They are very deep, slowly permeable, and moderately well drained. Clearbrook soils formed in local colluvium derived from olive and brown shale. They are in swales on uplands and are somewhat poorly drained.

Typical pedon of Calvin channery loam, 15 to 25 percent slopes, in a northwest-facing, convex, oak-hickory forest, 2,000 feet south of intersection of Resley Road and Rice Road, 50 feet east of Rice Road; near Hancock; lat. 39 degrees 42 minutes 55 seconds N. and long. 78 degrees 16 minutes 21 seconds W.

Oi—0 to 1 inch; leaves, twigs, and partly decomposed organic matter.

A—1 to 3 inches; dark reddish brown (5YR 3/2) channery loam; weak fine granular structure; very friable; many fine and common medium roots; 25 percent fine channers; very strongly acid; abrupt smooth boundary.

BA—3 to 4 inches; dark reddish brown (5YR 3/4) very channery loam; moderate fine granular structure; friable; many fine and medium and few coarse roots; few fine vesicular pores; 40 percent fine channers; very strongly acid; abrupt wave boundary.

Bw1—4 to 10 inches; reddish brown (2.5YR 4/4) very channery loam; moderate medium subangular blocky structure parting to weak fine platy; friable; common fine and medium and few coarse roots; common fine and few medium vesicular and tubular pores; 40 percent fine channers; very strongly acid; clear wavy boundary.

Bw2—10 to 23 inches; reddish brown (2.5YR 4/3) very channery loam; moderate fine platy structure; common fine and few medium roots; common fine and medium vesicular pores and few fine tubular pores; common distinct silt coatings on rock fragments; 55 percent channers; very strongly acid; clear wavy boundary.

C—23 to 34 inches; reddish brown (2.5YR 4/3) extremely channery loam; weak fine subangular blocky structure; common fine roots and common medium and few coarse voids between rock fragments; common distinct silt coats on rock fragments; 70 percent channers; very strongly acid; clear irregular boundary.

R—34 inches; weak red (10R 4/4) very fine grained sandstone and siltstone; highly fractured and strongly cemented; 90 percent flagstones, 5 percent fine earth, and 5 percent voids; few fine roots following fractures in rock.

The solum ranges from 20 to 30 inches in thickness. Depth to bedrock is 20 to 40 inches. Rock fragments range from 5 to 25 percent both in the A horizon and in the BA horizon where it occurs, from 25 to 55 percent in the B horizon, and from 50 to 75 percent in the C horizon. In unlimed areas reaction ranges from moderately acid to very strongly acid.

The A horizon has a hue of 7.5YR or 5YR, value of 2 to 5, and chroma of 2 to 4. It is silt loam or loam in the fine earth fraction.

The B horizon has hue of 10R to 5YR, value of 4 or 5, and a chroma of 3 to 6. It is silt loam or loam in the fine earth fraction. In some pedons few faint clay skins and silt coatings are in pores, on rock fragments, and on faces of peds.

The C horizon has a hue of 10R to 5YR, value of 2 to 5, and chroma of 2 to 4. It is silt loam or loam in the fine earth fraction.

CaB—Calvin channery loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Mountains

Component Description

Calvin and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.7 inches

A typical soil description is included in this section (see “Index to Series”). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see “Summary of Tables”).

Additional Components

Berks and similar soils

Composition: 5 percent
Landform: Summits and backslopes
Note: Berks soils are near the outer edge of the map unit.

Klinesville and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Clearbrook and similar soils

Composition: 4 percent
Landform: Swales, depressions, and drainageways

Brinkerton and similar soils

Composition: 1 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section “Use and Management of the Soils.”

CaC—Calvin channery loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Mountains

Component Description

Calvin and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.7 inches

A typical soil description is included in this section (see “Index to Series”). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see “Summary of Tables”).

Additional Components

Klinesville and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Weikert and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Clearbrook and similar soils

Composition: 4 percent
Landform: Swales, depressions, and drainageways

Brinkerton and similar soils

Composition: 1 percent

Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CaD—Calvin channery loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: Mountains

Component Description

Calvin and similar soils

Composition: 85 percent
Landform: Summits and backslopes of ridges
Slope: 15 to 25 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.6 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Klinesville and similar soils

Composition: 5 percent
Landform: Summits and backslopes on ridges

Weikert and similar soils

Composition: 5 percent
Landform: Summits and backslopes of ridges

Clearbrook and similar soils

Composition: 4 percent
Landform: Swales, depressions, and drainageways

Brinkerton and similar soils

Composition: 1 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Catoctin Series

The Catoctin series consists of moderately deep, well drained soils. Permeability is moderately rapid. These soils formed in residuum derived from metabasalt and greenstone schist. They are on uplands in Pleasant Valley in Washington County. Slopes range from 0 to 25 percent.

Catoctin soils are similar to Talladega soils and are mapped adjacent to Highfield, Lantz, Myersville, Mt. Zion, Ravenrock, and Rohrersville soils. Talladega soils formed in residuum derived from phyllite and schist, and have a weakly developed, argillic horizon. Highfield and Myersville soils are moderately permeable, are very deep, and have fewer rock fragments throughout in the solum than Catoctin soils. Lantz soils are poorly drained, are in concave drainageways and on footslopes, and are deeper to bedrock. Mt. Zion and Ravenrock soils are very deep, are moderately slow or slowly permeable, and formed in colluvium derived from greenstone. Rohrersville soils formed in local colluvium over residuum. They are deep to bedrock and slowly permeable. They have a seasonal high water table within a depth of 20 inches of the surface.

Typical pedon of Catoctin channery loam, in an area of Catoctin-Myersville channery loams, 8 to 15 percent slopes, in a southwest-facing, convex hayfield, 600 feet south of intersection of MD-67 and Gapland Road; near Gapland; lat. 39 degrees 23 minutes 52 seconds N. and long. 77 degrees 39 minutes 27 seconds W.

Ap—0 to 7 inches; dark yellowish brown (10YR 4/4), channery loam; common fine distinct strong brown (7.5YR 5/6) irregular mottles throughout; weak fine subangular blocky structure; very friable; many very fine and fine tubular pores and common very fine and fine vesicular pores; 30 percent subrounded greenstone schist channers; strongly acid; abrupt smooth boundary.

Bt—7 to 16 inches; strong brown (7.5YR 5/6) very channery loam; moderate medium subangular blocky structure; many fine and very fine roots throughout; many very fine and fine vesicular pores and common very fine and fine tubular pores; few faint patchy yellowish red (5YR 5/6) clay films on faces of peds; 40 percent subrounded greenstone schist channers; strongly acid; clear wavy boundary.

C—16 to 27 inches; strong brown (7.5YR 5/6) extremely channery loam; massive; friable; many very fine and fine roots throughout; common fine tubular pores and many fine vesicular pores; common distinct patchy yellowish red (5YR 5/6) clay films on rock fragments; 60 percent subrounded greenstone schist channers and 20 percent subangular greenstone schist flagstones; moderately acid; abrupt irregular boundary.

R—27 to 30 inches; strongly cemented greenstone schist; variegated; loam in the fine earth fraction; common very fine and fine roots in cracks; 60 percent subrounded greenstone schist channers and 30 percent flagstones.

The solum ranges from 15 to 30 inches in thickness. Depth to soft bedrock ranges from 20 to 40 inches. Rock fragments of greenstone schist and metabasalt channers range from 5 to 35 percent in the surface layer, from 15 to 55 percent in the subsoil, and from 35 to 80 percent in the substratum. Reaction is slightly acid in the A, E, and B horizons and is moderately acid to neutral in the C horizon.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam or loam.

The E horizon, where it occurs, has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 5 to 8. It is silt loam or loam.

The B horizon has hue of 5YR to 10YR, value 4 to 6, and chroma 4 to 8. It is silt loam, clay loam, loam, or silty clay loam.

The C horizon has variegated colors that have hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. It is silt loam, loam, clay loam, or sandy loam.

CcB—Catoctin-Myersville channery loams, 3 to 8 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Catoctin and similar soils

Composition: 45 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) is at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from greenstone or granitic gneiss
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.4 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Myersville and similar soils

Composition: 45 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of 50 to 70 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from greenstone or granitic gneiss
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 7.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Mt. Zion and similar soils

Composition: 10 percent
Landform: Saddles and swales

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CcC—Catoctin-Myersville channery loams, 8 to 15 percent slopes

Map Unit Setting

Landscape: Valleys
Note: Small areas of shallow soils are on convex landscapes and shoulders.

Component Description

Catoctin and similar soils

Composition: 60 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained

Parent material: Gravelly residuum derived from granitic gneiss or greenstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.4 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Myersville and similar soils

Composition: 30 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of 60 to 70 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from greenstone or granitic gneiss
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 7.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Mt. Zion and similar soils

Composition: 7 percent
Landform: Saddles and swales

Unnamed shallow soils

Composition: 3 percent
Landform: None assigned

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CcD—Catoctin-Myersville channery loams, 15 to 25 percent slopes

Map Unit Setting

Landscape: Valleys
Note: Small areas of shallow soils are on convex landscapes and shoulders.

Component Description

Catoctin and similar soils

Composition: 60 percent
Landform: Summits and backslopes
Slope: 15 to 25 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from greenstone or granitic gneiss
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.4 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Myersville and similar soils

Composition: 30 percent
Landform: Summits and backslopes
Slope: 15 to 25 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of 60 to 70 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from granitic gneiss and from greenstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 7.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Mt. Zion and similar soils

Composition: 5 percent
Landform: Concave footslopes, toeslopes, and drainageways

Unnamed shallow soils

Composition: 5 percent
Landform: None assigned

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Clearbrook Series

The Clearbrook series consists of moderately deep, somewhat poorly drained soils. Permeability is moderately slow. These soils formed in local colluvium and residuum derived from acid, gray shale. They are on flats and in concave draws on uplands. Slopes range from 0 to 8 percent.

Clearbrook soils are mapped adjacent to Berks, Brinkerton, Calvin, Klinesville, and Weikert soils. Brinkerton soils are poorly drained, are in well defined drainageways, have more silt than Clearbrook soils, and are very deep to bedrock. Berks, Calvin, Klinesville and Weikert soils are on convex uplands, formed in residuum derived from acid shale, are well drained, and have moderately rapid permeability.

Typical pedon of Clearbrook channery silt loam, 0 to 8 percent slopes, in southwest-facing, concave cropland, about 1,500 feet south of intersection of MD-68 and Bottom Road, 500 feet east of Bottom Road; near Pinesburg; lat. 39 degrees 37 minutes 20 seconds N. and long. 77 degrees 52 minutes 22 seconds W.

Ap1—0 to 10 inches; pale brown (10YR 5/3) channery silt loam; weak medium subangular blocky structure parting to weak fine granular; friable; many very fine and fine roots; common medium tubular pores; common fine prominent strong brown (7.5YR 4/6) iron concentrations; 15 percent shale channers; moderately acid; abrupt smooth boundary.

Bt1—10 to 16 inches; yellowish brown (10YR 5/4) channery silt loam; moderate medium subangular blocky structure; friable; common fine and few medium roots; many fine tubular and vesicular pores and common medium tubular pores; common fine and medium distinct light brownish gray (10YR 6/2) iron depletions; few prominent discontinuous strong brown (7.5YR 4/6) clay films on faces of peds; 25 percent shale channers; strongly acid; gradual smooth boundary.

Btg—16 to 27 inches; 45 percent gray (10YR 6/1) and 40 percent strong brown (10YR 5/8) very channery silty clay loam; weak medium subangular blocky structure; firm; common fine roots in cracks and on faces of peds; many fine vesicular pores and common fine tubular pores; 45 percent shale channers; very strongly acid; clear wavy boundary.

C—27 to 38 inches; 40 percent yellowish brown (10YR 5/4) and 30 percent gray (10YR 6/1) very channery silty clay loam; weak coarse and medium platy structure; firm; many fine tubular pores and common fine vesicular pores; common fine distinct light yellowish brown (2.5Y 6/4) iron accumulations; 55 percent shale channers; extremely acid, clear wavy boundary.

Cr—38 inches; variegated yellowish brown (10YR 5/4), light yellowish brown (2.5Y 6/4), and strong brown (7.5YR 5/8) shale; moderately cemented; silt loam in the fine earth fraction; many fine prominent black (5YR 2/1) manganese stains surrounding rock fragments; common fine distinct light brownish gray (10YR 6/2) iron depletions; 85 percent shale fragments of which 25 percent is paralithic and crushable under strong pressure.

The solum ranges from 18 to 36 inches in thickness. Depth to bedrock ranges from 20 to 40 inches. Rock fragments range from 10 to 60 percent in the A horizon and from 20 to 70 percent in the B horizon. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. It is silt loam or loam.

The Bt horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 3 or 4. It is silt loam, loam, silty clay, or silty clay loam.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. It is silty clay, silty clay loam, or clay loam.

The C horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 4. It is silt loam, silty clay loam, or silty clay.

CkB—Clearbrook channery silt loam, 0 to 8 percent slopes

Map Unit Setting

Landscape: Mountains

Component Description

Clearbrook and similar soils

Composition: 85 percent
Landform: Swales, depressions, and drainageways
Slope: 0 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of 20 to 40 inches
Drainage class: Somewhat poorly drained
Parent material: Gravelly colluvium derived from shale and siltstone, from sandstone and shale, or from sandstone and shale
Flooding: None
Water table: 1.0 to 2.5 feet
Available water capacity: Average of 4.8 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is

available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Berks and similar soils

Composition: 10 percent
Landform: Summits and backslopes
Note: Berks soils are near the outer edge of the map unit.

Brinkerton and similar soils

Composition: 5 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Codorus Series

The Codorus series consists of very deep, moderately well drained soils. Permeability is moderate. These soils formed in recently deposited alluvial materials derived from metamorphic and crystalline rocks near Pleasant Valley in Washington County. They are on active flood plains. Slopes range from 0 to 3 percent.

Codorus soils are similar to Hatboro soils and are mapped adjacent to Catoctin, Lantz, Myersville, Mt. Zion, and Rohrersville soils. Hatboro soils are poorly drained and typically are in backwater areas on flood plains. Catoctin, Myersville, and Mt. Zion soils are on adjacent uplands. Lantz and Rohrersville soils are in concave draws on uplands, are not subject to flooding, and have a water table within 20 inches of the surface.

Typical pedon of Codorus silt loam, in a level hayfield, about 1,000 feet north of Frog Eye Road and about 75 feet west of Israel Creek; south of Brownsville; lat. 39 degrees 21 minutes 48 seconds N. and long. 77 degrees 49 minutes 47 seconds W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure parting to weak fine granular; friable; many fine and few medium roots; neutral; abrupt smooth boundary.

Bw1—7 to 16 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; many fine roots; many fine and common medium tubular pores and few medium vesicular pores; neutral; clear smooth boundary.

Bw2—16 to 22 inches; yellowish brown (10YR 5/4) loam; moderate medium subangular blocky structure; friable; common fine roots; many fine tubular and vesicular pores and few medium tubular pores; 5 percent gravel; slightly acid; clear smooth boundary.

Bg—22 to 30 inches, grayish brown (10YR 5/2) loam; weak coarse subangular blocky structure; friable; common fine and few coarse roots; many fine and common medium tubular and vesicular pores; common medium prominent reddish brown (5YR 5/4) iron accumulations; few fine and medium distinct dark gray (10YR 4/1) organic coats in pores and on faces of peds; 5 percent gravel; slightly acid; clear smooth boundary.

C1—30 to 34 inches; dark brown (10YR 4/3) loam; common fine distinct yellowish brown (10YR 5/4) mottles; massive; friable; few fine roots; common medium and many fine tubular and vesicular pores; 5 percent gravel; slightly acid; clear smooth boundary.

2C2—34 to 40 inches; dark brown (10YR 4/3) very gravelly loamy sand; massive, single grain; very friable; many medium black (N 2/0) manganese concretions; 40 percent gravel; slightly acid; clear smooth boundary.

2C3—40 to 72 inches; yellowish brown (10YR 5/4) very gravelly loamy coarse sand; single grain; very friable; 50 percent gravel; slightly acid.

The solum ranges from 30 to 36 inches in thickness. Depth to bedrock is more than 72 inches. Depth to sand and stratified material is 30 inches or more. Coarse fragments range from 0 to 15 percent in the solum and from 0 to 25 percent in the substratum above a depth of 30 inches and 15 to 70 percent below a depth of 30 inches. In unlimed areas reaction ranges from neutral to moderately acid.

The Ap horizon has hue of 10YR, value of 3 to 6, and chroma of 2 or 3. It is silt loam or loam in the fine earth fraction.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam, clay loam, loam, or silty clay loam in the fine earth fraction.

The C horizon has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 1 to 4. It is silt loam, clay loam, loam, or silty clay loam, but below a depth of 40 inches it is loamy sand, sandy loam, or sand.

Cm—Codorus silt loam

Map Unit Setting

Landscape: River valleys

Component Description

Codorus

Composition: 80 percent

Landform: Flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Drainage class: Moderately well drained
Parent material: Loamy alluvium derived from greenstone, quartzite, and phyllite schist
Flooding: Occasional
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 6.5 inches
Note: In most areas gravelly layers are above a depth of 40 inches.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Unnamed well drained soils

Composition: 15 percent
Landform: None assigned

Hatboro and similar soils

Composition: 5 percent
Landform: Flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Cn—Codorus gravelly sandy loam

Map Unit Setting

Landscape: River valleys

Component Description

Codorus

Composition: 80 percent
Landform: Flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Gravelly sandy loam
Drainage class: Moderately well drained
Parent material: Loamy alluvium derived from greenstone, quartzite, phyllite, and schist
Flooding: Occasional
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 6.5 inches
Note: Most areas have a gravelly layer above a depth of 40 inches.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Unnamed well drained soils

Composition: 15 percent
Landform: None assigned

Hatboro and similar soils

Composition: 5 percent
Landform: Depressions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Combs Series

The Combs series consists of deep, well drained soils. Permeability is moderate or moderately rapid. These soils formed in recent alluvium eroded from sandstone, shale, siltstone, and limestone. They are on active flood plains along the Potomac River and its smaller tributaries. Slopes range from 0 to 3 percent.

Combs soils are similar to Lindside soils and are mapped adjacent to Bigpool, Deposit, Fairplay, Funkstown, Lappans, and Melvin soils. Lindside soils are moderately well drained and do not have a thick, dark brown surface layer. Fairplay and Lappans soils formed in marl alluvium and have a lighter colored solum than Combs soils. Melvin soils are poorly drained and formed in silty alluvium. Bigpool soils are on high flood plains and do not have a thick, dark brown surface layer. Deposit soils are near high gradient streams, are somewhat poorly drained, and have more rock fragment throughout the solum than Combs soils. Funkstown soils are moderately well drained and are not near perennial streams.

Typical pedon of Combs silt loam, on cropland, near Antietam Creek, 250 feet southwest of Battletown Road and 100 feet northwest of Antietam Creek; near Leitersburg; lat. 39 degrees 42 minutes 21 seconds N. and long. 77 degrees 37 minutes 20 seconds W.

Ap10 to 9 inches; dark brown (10YR 3/3) silt loam; strong fine granular structure; very friable; many fine and medium roots; common fine and medium tubular pores; neutral; clear wavy boundary.

Ap2—9 to 13 inches; dark brown (10YR 3/3) silt loam; strong medium granular structure; friable; many fine and medium roots; common fine and medium tubular pores; neutral; clear wavy boundary.

Bw1—13 to 23 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common fine and medium roots; few medium and coarse tubular pores; neutral; clear wavy boundary.
Bw2—23 to 41 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; common fine and medium roots; few medium and coarse tubular pores; 5 percent quartzite gravel; slightly acid; clear wavy boundary.
Ab—41 to 46 inches; very dark grayish brown (10YR 3/2) very fine sandy loam; weak medium subangular blocky structure parting to moderate fine granular; few fine roots; common fine and medium and few coarse tubular pores; neutral; clear wavy boundary.
C1—46 to 51 inches; dark yellowish brown (10YR 4/4) loam; massive; very friable; few fine roots; 5 percent quartzite gravel; moderately acid; clear wavy boundary.
C2—51 to 60 inches; yellowish brown (10YR 5/6) gravelly coarse sandy loam; single grain; loose; few coarse prominent yellowish red (5YR 4/6) iron accumulations; 15 percent gravel; moderately acid.

The solum ranges from 40 to 50 inches in thickness. The mollic epipedon ranges from 10 to 15 inches in thickness. Coarse fragments range from 0 to 5 percent in the surface layer, from 0 to 10 percent in the solum, and from 5 to 15 percent in the substratum. In some pedons they are stratified. Reaction ranges from moderately acid to neutral.

The Ap and Ab horizons have hue of 10YR, value of 3, and chroma of 2 or 3. They are silt loam, loam, fine sandy loam, or loam.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam, loam, fine sandy loam, or sandy loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma 4 to 6. It is loam, sandy loam, or fine sandy loam. It some pedons it has stratified sand and gravel.

Co—Combs fine sandy loam

Map Unit Setting

Landscape: River valleys

Component Description

Combs and similar soils

Composition: 85 percent
Landform: Flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Fine sandy loam
Drainage class: Well drained
Parent material: Loamy alluvium derived from limestone, sandstone, and shale
Flooding: Rare
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Lindside and similar soils

Composition: 10 percent
Landform: Flood plains

Melvin and similar soils

Composition: 5 percent
Landform: Flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Cp—Combs silt loam

Map Unit Setting

Landscape: River valleys

Component Description

Combs and similar soils

Composition: 85 percent
Landform: Flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Drainage class: Well drained
Parent material: Loamy alluvium derived from limestone, sandstone, and shale
Flooding: Rare
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Lindside and similar soils

Composition: 10 percent
Landform: Flood plains

Melvin and similar soils

Composition: 5 percent
Landform: Flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Dekalb Series

The Dekalb series consists of moderately deep, well drained soils. Permeability is rapid. These soils formed in residuum derived from acid, brown and gray sandstone and quartzite. These soils are on summits of prominent ridges capped by sandstone. Slopes range from 0 to 65 percent.

Dekalb soils are similar to Calvin soils and are mapped adjacent to Bagtown, Berks, Hazleton, Klinesville, Pecktonville, Sideling, and Weikert soils. Berks, Calvin, Klinesville, and Weikert soils have more silt and clay in the profile than Dekalb soils and formed in residuum derived from shale and siltstone. Hazleton soils are very deep to hard bedrock. Bagtown and Sideling soils formed in colluvium. They are very deep, slowly permeable, and moderately well drained. Pecktonville soils formed in cherty limestone. They are very deep and have a seasonal high water between depths of 40 and 60 inches. Sandstone or quartzite outcrops are common on Dekalb soils.

Typical pedon of Dekalb channery loam, 15 to 25 percent slopes, very stony, in an east-facing, convex, oak hickory forest, 300 feet south of MD-40, on the summit of Sideling Hill; near Hancock; lat. 39 degrees 41 minutes 13 seconds N. and long. 78 degrees 18 minutes 17 seconds W.

Oi—0 to 1 inch; leaves, twigs, and partly decomposed organic matter; stones cover 2 percent of the surface and make up 2 percent of the surface layer.

A—1 to 3 inches; very dark brown (10YR 2/2) channery loam; weak fine granular structure; very friable; many fine and common medium roots; 15 percent fine channers and 2 percent stones; very strongly acid; abrupt smooth boundary.

BA—3 to 7 inches; dark brown (10YR 4/3) very channery sandy loam; weak fine and medium subangular blocky structure; very friable; many fine and medium and few coarse roots; few coarse tubular pores filled with very dark brown (10YR 2/2) organic material; 35 percent channers; very strongly acid; clear wavy boundary.

Bw1—7 to 14 inches; light grayish brown (10YR 6/4) very channery sandy loam; weak fine and medium subangular blocky structure; very friable; common fine and medium and few coarse roots; common fine and few medium vesicular and tubular pores; few coarse tubular pores filled with very dark brown (10YR 2/2) material; 40 percent channers; very strongly acid; clear wavy boundary.

Bw2—10 to 23 inches; light grayish brown (10YR 6/4) very channery loam; weak fine subangular blocky; very friable; common fine and few medium roots; common fine and medium vesicular and few fine tubular pores; 45 percent channers and 5 percent flagstones; very strongly acid; abrupt wavy boundary.

C—23 to 34 inches; yellowish brown (10YR 5/6) extremely channery loamy sand; weak fine subangular blocky structure; few fine roots; common medium and few coarse voids between rock fragments; 70 percent channers; very strongly acid; abrupt irregular boundary.

R—34 inches; very pale brown (10YR 7/4) very fine grained, indurated sandstone; highly fractured; 90 percent flagstones, 5 percent loamy fine sand, and 5 percent voids; few fine roots following fractures in rock.

The solum ranges from 20 to 35 inches in thickness. Depth to bedrock is 20 to 40 inches. Rock fragments range from 5 to 35 percent in the A horizon, from 15 to 55 percent in the B horizon, and from 50 to 75 percent in the C horizon. Surface stones and boulders cover 1 to 25 percent of the surface. In unlimed areas reaction is extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 2 to 3, and chroma of 1 or 2. It is sandy loam or loam in the fine earth fraction.

The BA horizon has hue of 10YR, value of 4 or 5, and a chroma of 3 to 4. It is sandy loam and loam in the fine earth fraction.

The B horizon has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 4 to 8. It is loam or sandy loam in the fine earth fraction.

The C horizon has hue of 7.5YR to 10YR, value of 5 or 6, and chroma of 4 to 6. It is sandy loam or loamy sand in the fine earth fraction.

DaB—Dekalb channery loam, 3 to 8 percent slopes, very stony

Map Unit Setting

Landscape: Mountains
Note: Less than 10 percent of this map unit has spodic characteristics.

Component Description

Dekalb and similar soils

Composition: 80 percent
Landform: Ridges
Slope: 3 to 8 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from sandstone and shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.7 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Hazleton and similar soils

Composition: 15 percent
Landform: Shoulders and backslopes of mountains

Unnamed moderately well drained soils

Composition: 5 percent
Landform: None assigned

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DaC—Dekalb channery loam, 8 to 15 percent slopes, very stony

Map Unit Setting

Landscape: Mountains
Note: Less than 10 percent of this map unit has spodic characteristics.

Component Description

Dekalb and similar soils

Composition: 80 percent
Landform: Ridges
Slope: 8 to 15 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from sandstone and shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.7 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Hazleton and similar soils

Composition: 15 percent
Landform: Shoulders and backslopes of mountains

Moderately well drained soils

Composition: 5 percent
Landform: None assigned

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DaD—Dekalb channery loam, 15 to 25 percent slopes, very stony

Map Unit Setting

Landscape: Mountains
Note: Less than 10 percent of this map unit has spodic characteristics.

Component Description

Dekalb and similar soils

Composition: 80 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained

Parent material: Gravelly alluvium derived from sandstone and shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.7 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Hazleton and similar soils

Composition: 20 percent
Landform: Shoulders and backslopes of mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DeA—Dekalb-Rock outcrop complex, 0 to 3 percent slopes

Map Unit Setting

Landscape: Mountains
Note: Less than 15 percent of this map unit has spodic characteristics.

Component Description

Dekalb and similar soils

Composition: 55 percent
Landform: Ridges
Slope: 0 to 3 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from sandstone and shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.7 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 35 percent
Landform: Ridges
Slope: 0 to 3 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at or above the surface
Parent material: Sandstone and shale
Flooding: None

Additional Components

Bagtown and similar soils

Composition: 5 percent
Landform: Summits, and treads and risers on backslopes of mountains

Hazleton and similar soils

Composition: 5 percent
Landform: Shoulders and backslopes of mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DeB—Dekalb-Rock outcrop complex, 3 to 8 percent slopes

Map Unit Setting

Landscape: Mountains
Note: Less than 15 percent of this map unit has spodic characteristics.

Component Description

Dekalb and similar soils

Composition: 55 percent
Landform: Ridges
Slope: 3 to 8 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from sandstone and shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.7 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 35 percent
Landform: Ridges
Slope: 3 to 8 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at or above the surface
Parent material: Sandstone and shale
Flooding: None

Additional Components

Bagtown and similar soils

Composition: 5 percent
Landform: Summits, and treads and risers on backslopes of mountains

Hazleton and similar soils

Composition: 5 percent
Landform: Shoulders and backslopes of mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DeC—Dekalb-Rock outcrop complex, 8 to 15 percent slopes

Map Unit Setting

Landscape: Mountains
Note: Less than 15 percent of the map unit has spodic characteristics.

Component Description

Dekalb and similar soils

Composition: 50 percent
Landform: Ridges
Slope: 8 to 15 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from sandstone and shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.7 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 35 percent
Landform: Ridges
Slope: 8 to 15 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at or above the surface
Parent material: Sandstone and shale
Flooding: None

Additional Components

Hazleton and similar soils

Composition: 10 percent
Landform: Shoulders and backslopes of mountains

Bagtown and similar soils

Composition: 5 percent
Landform: Summits, and treads and risers on backslopes of mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DeD—Dekalb-Rock outcrop complex, 15 to 25 percent slopes

Map Unit Setting

Landscape: Mountains
Note: Less than 10 percent of this map unit has spodic characteristics.

Component Description

Dekalb and similar soils

Composition: 45 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from sandstone and shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.7 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is

available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 35 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at or above the surface
Parent material: Sandstone and shale
Flooding: None

Additional Components

Hazleton and similar soils

Composition: 15 percent
Landform: Shoulders and backslopes of mountains

Bagtown and similar soils

Composition: 5 percent
Landform: Summits, and treads and risers on backslopes of mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DgF—Dekalb-Bagtown-Rock outcrop complex, 25 to 65 percent slopes

Map Unit Setting

Landscape: Mountains
Note: Rubbly areas are common in this map unit.

Component Description

Bagtown and similar soils

Composition: 35 percent
Landform: Summits, and treads and risers on backslopes of mountains
Slope: 25 to 65 percent
Texture of the surface layer: Cobbly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 72 inches or more
Drainage class: Well drained
Parent material: Loamy colluvium derived from quartzite
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 8.0 inches

Dekalb and similar soils

Composition: 35 percent
Landform: Summits, and treads and risers on backslopes of mountains and ridges
Slope: 25 to 65 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from sandstone and shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.7 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 20 percent
Landform: Summits, and treads and risers on backslopes of mountains and ridges
Slope: 25 to 65 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at or near the surface
Parent material: Sandstone and shale
Flooding: None

Additional Components

Airmont and similar soils

Composition: 10 percent
Landform: Head slopes, footslopes, and drainageways on mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DhF—Dekalb and Hazleton soils, 25 to 65 percent slopes, rubbly

Map Unit Setting

Landscape: Mountains
Note: Small areas of red sandy material are in this map unit.

Component Description

Dekalb and similar soils

Composition: 35 percent

Landform: Ridges
Slope: 25 to 65 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from sandstone and shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.7 inches

Hazleton and similar soils

Composition: 30 percent
Landform: Shoulders and backslopes of mountains
Slope: 25 to 65 percent
Texture of the surface layer: Channery sandy loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 70 to 90 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from quartzite
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 4.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 20 percent
Landform: Shoulders and backslopes of mountains
Slope: 25 to 65 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at or near the surface
Parent material: Sandstone and shale
Flooding: None

Additional Components

Sideling and similar soils

Composition: 15 percent
Landform: Backslopes and footslopes on mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Deposit Series

The Deposit series consists of very deep, somewhat poorly drained soils. Permeability is moderate or moderately rapid. These soils formed in acid alluvium eroded from soils derived from shale and sandstone on uplands. They are on flood plains along streams. Slopes range from 0 to 8 percent.

Deposit soils are similar to Philo soils and are mapped adjacent to Atkins, Bigpool, Combs, Fairplay, Lappans, Lindside, Melvin, and Pope soils. Combs soils have a thick, dark brown surface layer and are well drained. Fairplay and Lappans soils formed in marl alluvium. They have a lighter colored solum than Deposit soils. Lindside soils have less sand and gravel throughout in the solum than Deposit soils. Melvin soils formed in silty alluvium and are poorly drained. Bigpool soils are on higher flood plains along the Potomac River and are subject to occasional flooding. Atkins soils are poorly drained. Philo soils have fewer rock fragments in the solum than Deposit soils. Pope soils are well drained and have fewer rock fragments in the solum than Deposit soils.

Typical pedon of Deposit gravelly loam, in pasture, along Little Conococheague Creek, about 700 feet north of Broadfording Road and 500 feet west of intersection of Cohill and Broadfording Roads northeast of Clear Spring; lat. 39 degrees 40 minutes 19 seconds N. and long. 77 degrees 55 minutes 6 seconds W.

Ap1—0 to 6 inches; dark grayish brown (2.5Y 4/2) gravelly loam; strong fine granular structure; friable; many fine roots; 15 percent gravelly; slightly alkaline; clear smooth boundary.

Ap2—6 to 11 inches; dark grayish brown (2.5Y 4/2) loam; moderate fine subangular blocky structure; very friable; many fine roots; common fine subrounded iron-manganese concretions throughout; few distinct discontinuous brown (10YR 5/3) organic coats in root channels; 10 percent gravel; slightly alkaline; abrupt smooth boundary.

Bw1—11 to 24 inches; yellowish brown (10YR 5/4) loam; weak medium prismatic structure parting to moderate fine subangular blocky; firm; many fine roots; common fine tubular and vesicular pores; few distinct discontinuous brown (10YR 5/3) organic coats in root channels and in pores; common fine subrounded iron-manganese concretions throughout; common fine distinct (10YR 5/1) iron depletions and few fine prominent brownish yellow (10YR 6/8) iron accumulations; 20 percent gravel; moderately acid; clear wavy boundary.

C1—24 to 37 inches; 15 percent yellowish brown

(10YR 5/4) and 40 percent brownish yellow (10YR 6/8) very gravelly clay loam; weak coarse subangular blocky structure; firm; common fine roots; few fine tubular and vesicular pores; common fine and medium distinct light olive brown (2.5Y 5/3) organic coats in pores and by roots; few fine prominent black (7.5YR 2/0) subrounded manganese concretions; 50 percent gravel; strongly acid; clear wavy boundary.

C2—37 to 44 inches; 65 percent brown (10YR 5/3) and 20 percent yellowish brown (10YR 5/8) very gravelly clay loam; massive parting to weak fine subangular blocky structure; firm; few fine roots; common medium tubular and vesicular pores; many fine light olive brown (2.5Y 5/3) organic films by roots; common medium distinct gray (10YR 5/1) iron depletions; 45 percent gravel; strongly acid; clear wavy boundary.

Abg—44 to 48 inches; dark grayish brown (10YR 4/2) very gravelly sandy clay loam; massive; friable; few fine roots; common fine faint grayish brown (10YR 5/2) iron depletions; common fine distinct yellowish brown (10YR 5/6) and few fine distinct brownish yellow (10YR 6/8) iron accumulations; 40 percent gravel; strongly acid; broken irregular boundary.

C3—48 to 65 inches; yellowish brown (10YR 5/4) extremely gravelly clay loam; massive; friable; few fine roots; many coarse distinct gray (10YR 5/1) iron depletions; many medium distinct brownish yellow (10YR 6/8) iron accumulations; 40 percent gravel, 15 percent cobbles, and 10 percent flagstones; strongly acid; clear wavy boundary.

C4—65 to 80 inches; yellowish brown (10YR 5/4) very gravelly sandy clay loam; massive; friable; many medium distinct light brownish gray (10YR 6/2) iron depletions; 35 percent gravel; strongly acid.

The solum ranges from 20 to 30 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments range from 10 to 60 percent in the solum and from 35 to 70 percent in the substratum. In unlimed areas reaction ranges from slightly alkaline to strongly acid.

The A or Ap horizon has a hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. It is loam, silt loam, or their gravelly analog in the fine earth fraction.

The B horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 3 or 4. It is loam, silt loam, clay loam, sandy clay loam, or their gravelly analog in the fine earth fraction.

The C and 2C horizons have hue of 5YR to 2.5YR, value of 3 to 5, and chroma of 3 or 4. They are loam, sandy loam, or their gravelly analog in the fine earth fraction.

Dk—Deposit gravelly loam

Map Unit Setting

Landscape: River valleys

Component Description

Deposit and similar soils

Composition: 80 percent
Landform: Flood plains, some of which are narrow and have high gradients
Slope: 0 to 3 percent
Texture of the surface layer: Gravelly loam
Drainage class: Somewhat poorly drained
Parent material: Gravelly alluvium derived from quartzite or from sandstone and shale
Flooding: Rare
Water table: 1.5 to 2.0 feet
Available water capacity: Average of 3.4 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Atkins and similar soils

Composition: 5 percent
Landform: Flood plains

Hatboro and similar soils

Composition: 5 percent
Landform: Depressions

Pope and similar soils

Composition: 5 percent
Landform: Flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DnB—Deposit gravelly loam, 0 to 8 percent slopes, very stony

Map Unit Setting

Landscape: River valleys

Component Description

Deposit and similar soils

Composition: 80 percent
Landform: Flood plains, some of which are narrow and have high gradients
Slope: 0 to 8 percent
Texture of the surface layer: Gravelly loam
Drainage class: Somewhat poorly drained
Parent material: Gravelly alluvium derived from quartzite or from sandstone and shale
Flooding: Rare
Water table: 1.5 to 2.0 feet
Available water capacity: Average of 3.4 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Atkins and similar soils

Composition: 5 percent
Landform: Depressions

Hatboro and similar soils

Composition: 5 percent
Landform: Depressions

Pope and similar soils

Composition: 5 percent
Landform: Flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Downsville Series

The Downsville series consists of very deep, well drained soils. Permeability is moderate. These soils formed in old alluvium that consists of chert but mostly of sandstone, shale, and limestone. They are on old stream terraces along major water courses. Slopes range from 0 to 45 percent.

Downsville soils are similar to Monongahela, Tyler, and Walkersville soils and are mapped adjacent to Berks, Bigpool, Combs, Deposit, Duffield, Hagerstown, Lindside, Melvin, Nollville, Opequon, Ryder, and Weikert soils. Monongahela, Tyler, and Walkersville soils have fewer rock fragments in the solum than Downsville soils and are on lower terraces than those soils. Monongahela and Tyler soils have a seasonal high water table above a depth of 40 inches. Berks and Weikert soils are on shale uplands, are not subject to flooding, and have bedrock at a depth between 10 and 40 inches. Bigpool, Combs, Deposit, Lindside, and Melvin soils are all on lower, active flood plains. Duffield, Hagerstown, and Nollville soils formed in residuum derived from limestone and do not have rounded gravel or sand in the solum. Ryder and Opequon soils are shallower to limestone bedrock than Downsville soils.

Typical pedon of Downsville gravelly loam, 3 to 8 percent slopes, on a convex slope, in a cultivated field, about 50 feet north of Falling Water Road, 2,800 feet south and 5,300 feet east of the Potomac River; lat. 39 degrees 33 minutes 21 seconds N. and long. 77 degrees 52 minutes 3 seconds W.

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) gravelly loam; moderate fine and medium subangular blocky structure parting to moderate medium granular; friable; common fine roots; 25 percent gravel and 5 percent cobbles; neutral; abrupt smooth boundary.

BE—10 to 18 inches; dark yellowish brown (10YR 4/4) very gravelly loam; moderate fine subangular blocky structure; friable; few very fine roots; many fine and common medium tubular and vesicular pores; 35 percent gravel and 5 percent cobbles; neutral; clear wavy boundary.

Bt1—18 to 30 inches; strong brown (7.5YR 5/6) very gravelly loam; moderate medium subangular blocky structure; friable; few very fine roots; few fine tubular and vesicular pores; many prominent red (2.5YR 4/6) clay films on faces of peds and on rock fragments; 40 percent gravel and 5 percent cobbles; strongly acid; clear wavy boundary.

Bt2—30 to 41 inches; yellowish red (5YR 5/6) very gravelly clay loam; moderate fine blocky structure; friable; few fine and very fine roots; common fine and few medium tubular and vesicular pores; many fine distinct red (2.5YR 4/6) continuous clay films on faces of peds and on rock fragments; 40 percent gravel and 10 percent cobbles; very strongly acid; clear wavy boundary.

Bt3—41 to 87 inches; red (2.5YR 4/6) very gravelly sandy clay loam; moderate fine subangular blocky structure; friable; few fine roots; few medium vesicular pores and few fine tubular pores; many fine faint dark red (2.5YR 3/6) continuous clay films on faces of peds and on rock fragments; 40 percent gravel and 10 percent cobbles; very strongly acid; gradual smooth boundary.

Bt4—87 to 106 inches; red (2.5YR 4/6) very gravelly sandy clay loam; moderate fine subangular structure; very friable; few medium vesicular pores and few fine tubular pores; common fine faint dark red (2.5YR 3/6) continuous clay films on faces of peds and on rock fragments; 35 percent gravel and 5 percent cobbles; very strongly acid; gradual smooth boundary.

BC—106 to 118 inches; yellowish red (5YR 5/8) very gravelly sandy loam; moderate medium subangular blocky structure; very friable; common fine distinct red (2.5YR 4/6) discontinuous clay films on faces of peds and on rock fragments; 40 percent gravel and 10 percent cobbles; very strongly acid; clear smooth boundary.

2C—118 to 134 inches; brownish yellow (10YR 6/8) to yellow (10YR 8/6) loam; moderate medium platy structure; friable; common fine prominent red (2.5YR 4/6) discontinuous clay films lining fractures between rock fragments; 5 percent channers; very strongly acid.

The solum ranges from 60 to 120 inches. Depth to bedrock is more than 6 feet. Gravel- and cobble-size fragments of chert, but mostly of sandstone, limestone, and shale range from 15 to 40 percent in the Ap and BE horizons and from 35 to 70 percent in the Bt, BC, and 2C horizons. In unlimed areas reaction ranges from neutral to very strongly acid.

The Ap horizon has hue of 7.5YR to 10YR, value 3 to 5, and chroma 4 to 6. It is loam, sandy loam, or silt loam. Gravel ranges from 15 to 35 percent and cobbles range from 0 to 20 percent. In unlimed areas reaction ranges from moderately acid to neutral.

The BE horizon has hue of 7.5YR to 10YR, value 4 or 5, and chroma of 3 to 7. It is loam, sandy loam, or silt loam. Gravel ranges from 15 to 30 percent and cobbles range from 5 to 15 percent. Reaction ranges from moderately acid to neutral.

The Bt horizon has hue of 7.5YR or 2.5YR, value of 4 or 5, and chroma of 4 to 8. It is clay loam, sandy clay loam, or clay. Gravel ranges from 35 to 60 percent and cobbles range from 5 to 15 percent. Reaction is very strongly acid or strongly acid.

The BC horizon has hue of 7.5YR to 2.5YR, value of 4 or 5, and chroma of 4 to 8. It is clay loam, sandy clay loam, or clay. Gravel ranges from 35 to 60 percent, and cobbles range from 5 to 15 percent. Reaction is very strongly acid or strongly acid.

The 2C horizon has hue of 10YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam, silt loam, or clay loam. Gravel and channers range from 5 to 25 percent. Reaction is very strongly acid or strongly acid.

DoA—Downsville gravelly loam, 0 to 3 percent slopes

Map Unit Setting

Landscape: River valleys

Component Description

Downsville and similar soils

Composition: 85 percent
Landform: High stream terraces
Slope: 0 to 3 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly, old alluvium derived from limestone and sandstone or from shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 7.6 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Funkstown and similar soils

Composition: 5 percent
Landform: Drainageways

Swanpond and similar soils

Composition: 5 percent
Landform: Upland flats

Opequon and similar soils

Composition: 4 percent
Landform: Summits and backslopes

Unnamed soils

Composition: 1 percent
Landform: Depressions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DoB—Downsville gravelly loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: River valleys

Note: Depressions where water is ponded are common. In some areas cobbles cover as much as 10 percent of the surface, the surface layer is sandier than described, or both.

Component Description

Downsville and similar soils

Composition: 85 percent
Landform: High stream terraces
Slope: 3 to 8 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly, old alluvium derived from limestone and sandstone or from shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 7.6 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Funkstown and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Opequon and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Swanpond and similar soils

Composition: 3 percent
Landform: Upland flats

Unnamed soils

Composition: 2 percent
Landform: Depressions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DoC—Downsville gravelly loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: River valleys
Note: Depressions where water is ponded are common. In some areas cobbles cover as much as 10 percent of the surface, the surface layer is sandier than described, or both. Limestone outcrops are common on eroded landscapes.

Component Description

Downsville and similar soils

Composition: 85 percent
Landform: High stream terraces
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly, old alluvium derived from limestone and sandstone or from shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 7.6 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Opequon and similar soils

Composition: 15 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DoD—Downsville gravelly loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: River valleys
Note: Depressions where water ponds is common. In some areas cobbles cover as much as 10 percent of the surface. Limestone outcrops are common on eroded landscapes.

Component Description

Downsville and similar soils

Composition: 85 percent
Landform: High stream terraces
Slope: 15 to 25 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained

Parent material: Gravelly, old alluvium derived from limestone and sandstone or from shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 6.6 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Opequon and similar soils

Composition: 15 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DoE—Downsville gravelly loam, 25 to 45 percent slopes

Map Unit Setting

Landscape: River valleys
Note: About 10 percent of the map unit consists of rock outcrops and shallow areas.

Component Description

Downsville and similar soils

Composition: 85 percent
Landform: High stream terraces
Slope: 25 to 45 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly, old alluvium derived from limestone and sandstone or from shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 6.6 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Opequon and similar soils

Composition: 15 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Dryrun Series

The Dryrun series consists of very deep, moderately well drained soils. Permeability is moderately slow in the subsoil and moderately rapid or rapid in the substratum. These soils formed in old alluvial material eroded from surrounding mountains over residuum derived from limestone. They are on alluvial fans, on fan terraces, and along drainageways. Slopes range from 0 to 8 percent.

Dryrun soils are similar to Murrill soils and are mapped adjacent to Braddock, Duffield, Funkstown, Hagerstown, Opequon, Ryder, and Swanpond soils. Murrill soils are well drained and have fewer rock fragments in the solum. Braddock soils are redder than Dryrun soils, have fewer rock fragments throughout, and average more than 35 percent clay throughout. Duffield, Hagerstown, Opequon, and Ryder soils are on convex uplands, formed in residuum derived from limestone, have fewer rock fragments throughout, and are well drained. Swanpond soils are on flats on concave uplands, average more than 60 percent clay throughout, have fewer than 25 percent rock fragments, and are slowly permeable. Funkstown soils are in drainageways on concave uplands, are subject to flooding, and are moderately well drained.

Typical pedon of Dryrun gravelly loam, 0 to 3 percent slopes, on cropland, 0.5 mile east of intersection of Fairview Road and St. Paul Church Road, 200 feet north of Fairview Road near the community of Dry Run; lat. 39 degrees 42 minutes 47 seconds N. and long. 77 degrees 52 minutes 28 seconds W.

Ap1—0 to 6 inches; brown (10YR 4/3) gravelly loam; weak medium platy structure parting to weak fine granular; friable; many fine roots; common medium vesicular pores and few medium tubular pores; 10 percent mixed gravel, 5 percent cobbles, and 5 percent channers that are all waterworn; neutral; clear smooth boundary.

Ap2—6 to 12 inches; brown (10YR 4/3) gravelly loam; weak medium platy structure parting to weak fine subangular blocky; friable; many fine roots; many fine tubular and vesicular pores, few medium vesicular pores, and common medium tubular pores; 10 percent gravel, 5 percent cobbles, and 5 percent channers that are all waterworn; neutral; abrupt smooth boundary.

BE—12 to 21 inches; yellowish brown (10YR 5/6) gravelly silt loam; common medium distinct brown or dark brown (10YR 4/3) surface material in pores; moderate medium subangular blocky structure; friable; many fine roots; many fine tubular and vesicular pores, common medium tubular pores, and few medium vesicular pores; 10 percent gravel, 5 percent channers, and 5 percent cobbles that are all waterworn; neutral; clear smooth boundary.

Bt1—21 to 27 inches; yellowish brown (10YR 5/6) very gravelly loam; moderate medium subangular blocky structure parting to moderate medium platy in the lower part of the horizon; friable; common fine roots; many fine and common medium tubular and vesicular pores and few coarse vesicular pores; common medium prominent red (5YR 4/6) iron accumulations; common faint discontinuous clay films on faces of peds; 20 percent gravel, 10 percent channers, 3 percent cobbles, and 5 percent flagstones that are all waterworn; slightly acid; gradual irregular boundary.

Bt2—27 to 43 inches; strong brown (7.5YR 5/6) extremely gravelly sandy clay loam; many coarse prominent pale brown (10YR 6/3) mottles; moderate medium platy structure in upper part of the horizon parting to weak medium platy in the lower part; firm; few fine roots; common fine and few medium tubular pores and many fine and common coarse vesicular pores; many medium distinct light gray (7.5YR 7/1) iron depletions; many medium faint strong brown (7.5YR 5/8) iron accumulations; prominent reddish brown (5YR 4/4) iron concentrations; many medium iron-manganese stains on faces of peds, on rock fragments, and lining pores; many prominent discontinuous clay films on faces of peds and in pores; 55 percent gravel, 5 percent flagstones, and 5 percent cobbles that are all waterworn; moderately acid; clear wavy boundary.

BC—43 to 61 inches; strong brown (7.5YR 5/6) extremely gravelly sandy clay loam; weak fine subangular blocky structure; friable; many fine vesicular pores; many medium iron-manganese stains; many faint patchy clay films on faces of peds and on rock fragments; 60 percent gravel, 15 percent channers, 3 percent flagstones, and 5 percent cobbles that are all waterworn; strongly acid; clear wavy boundary.

C—61 to 74 inches; dark brown (7.5YR 4/4) extremely gravelly sandy clay loam; massive; friable; many fine and few medium vesicular pores; common medium distinct strong brown (7.5YR 5/8) iron accumulations; few medium faint light brown (7.5YR 6/4) mottles; few distinct discontinuous clay films surrounding rock fragments and in pores; 60 percent gravel, 15 percent channers, 5 percent flagstones, and 5 percent cobbles that are all waterworn; moderately acid.

The solum ranges from 40 to 60 inches in thickness. Depth to underlying limestone material is more than 70 inches. Depth to bedrock is more than 80 inches. Depth to redoximorphic features is more than 24 inches. Fragments of sandstone, shale, and limestone range from 10 to 25 percent in the Ap and BE horizons and from 35 to 75 percent in the subsoil and substratum. Reaction ranges from neutral to very strongly acid.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. It is silt loam, loam, or their gravelly or cobbly analogs. Cobbles range, by volume, to 15 percent.

The BE horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 3 to 6. It is silt loam, loam, clay loam, or their gravelly or cobbly analogs. Cobbles range, by volume, to 10 percent.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is clay loam, sandy clay loam, loam, loamy sand, or silt loam. In some pedons the Bt horizon exhibits brittleness.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 8, and chroma of 4 to 8. It is loam, silt loam, sandy loam, sandy clay loam, clay loam, or their gravelly or cobbly analogs.

DrA—Dryrun gravelly loam, 0 to 3 percent slopes

Map Unit Setting

Landscape: Karst landscapes (fig. 17)
Note: Rock outcrops take in about 1 percent of some delineations. Pesticides leaching into and contaminating ground water are a severe hazard in this map unit.

Component Description

Dryrun and similar soils

Composition: 85 percent
Landform: Alluvial fans
Slope: 0 to 3 percent
Texture of the surface layer: Gravelly loam
Drainage class: Moderately well drained
Parent material: Gravelly, old alluvium derived from limestone and sandstone or from shale
Flooding: None
Water table: 2.0 to 3.5 feet

Available water capacity: Average of 7.9 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Murrill and similar soils

Composition: 5 percent
Landform: Alluvial fans

Deposit and similar soils

Composition: 3 percent
Landform: Flood plains

Hagerstown and similar soils

Composition: 3 percent
Landform: Summits and backslopes

Funkstown and similar soils

Composition: 2 percent
Landform: Drainageways

Unnamed soils

Composition: 2 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DrB—Dryrun gravelly loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: Rock outcrops take in about 1 percent of some delineations. Leaching pesticides and ground water contamination are severe hazards in this map unit.

Component Description

Dryrun and similar soils

Composition: 85 percent
Landform: Alluvial fans
Slope: 3 to 8 percent
Texture of the surface layer: Gravelly loam
Drainage class: Moderately well drained
Parent material: Gravelly, old alluvium derived from limestone and sandstone or from shale
Flooding: None
Water table: 2.0 to 3.5 feet
Available water capacity: Average of 7.9 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Murrill and similar soils

Composition: 7 percent
Landform: Undulating, old colluvial fans

Deposit and similar soils

Composition: 4 percent
Landform: Flood plains

Hagerstown and similar soils

Composition: 3 percent
Landform: Summits and backslopes

Unnamed soils

Composition: 1 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Duffield Series

The Duffield series consists of very deep, well drained soils. Permeability is moderate. These soils formed in residuum derived from impure limestone. They are on steep uplands in the central limestone valley of Washington County. Slopes range from 0 to 25 percent.

Duffield soils are similar to Hagerstown soils and are mapped adjacent to Dryrun, Funkstown, Murrill, Nollville, Opequon, Ryder, and Swanpond soils. Hagerstown soils are redder and more alkaline than Duffield soils and on average are more than 35 percent clay throughout. Dryrun soils formed in old alluvium and colluvium on broad, alluvial flats and are moderately well drained. Funkstown soils are in drainageways on uplands. They are subject to flooding, formed in local alluvium over residuum derived from limestone, and are moderately well drained. Murrill

Figure 17.—Typical landscape of Dryrun gravelly loam, 0 to 3 percent slopes, near Dryrun.

soils formed in acid colluvium over residuum derived from limestone and have more rock fragments in the solum than Duffield soils. Nollville soils formed in limy shale and are more alkaline than Duffield soils. Opequon and Ryder soils have bedrock within a depth of 40 inches. Swanpond soils are in flats and depressions on slightly concave uplands, on average are more than 60 percent clay, have slow permeability, and are moderately well drained. Limestone outcrops are common on the same landscapes as Duffield soils.

Typical pedon of Duffield silt loam, 8 to 15 percent slopes, on southeast-facing, convex cropland, 1,850 feet east of intersection of MD-11 and Long Meadow Road, 200 feet north of Long Meadow Road; near Paramount; lat. 39 degrees 41 minutes 4 seconds N. and long. 77 degrees 42 minutes 54 seconds W.

Ap—0 to 12 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; very friable; many fine and very fine roots; 5 percent limestone channers; neutral; clear smooth boundary.

Bt1—12 to 22 inches; brownish yellow (10YR 6/6) silt loam; weak medium subangular blocky structure; friable; common fine roots; many fine and common medium tubular pores; few distinct discontinuous clay films on faces of peds and in pores; slightly acid; clear wavy boundary.

Bt2—22 to 30 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots in pores and along faces of peds; many fine tubular and vesicular pores and common medium tubular pores; many fine and medium distinct black (N 2/0) manganese stains on faces of peds and lining pores; common prominent clay films on faces of peds and in pores; 5 percent limestone channers; moderately acid; clear wavy boundary.

Bt3—30 to 60 inches; strong brown (7.5YR 5/8) silty clay loam; weak coarse prismatic structure parting to strong medium subangular blocky; firm; common fine roots; common fine and few medium tubular and vesicular pores; common fine and medium distinct black (N 2/0) manganese stains on faces of peds and lining pores; many distinct discontinuous clay films on faces of peds and in pores; moderately acid; clear wavy boundary.

The solum ranges from 40 to 70 inches in thickness. Depth to bedrock is more than 6 feet. Fragments of weathered limestone, quartz, chert, and shale range from 0 to 20 percent in the upper part of the solum and from 0 to 40 percent in the lower part of the solum and in the substratum. Reaction ranges from strongly acid to neutral throughout the solum.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma 2 to 4. It is silt loam, loam, or silty clay loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 8, and chroma of 4 to 8. It is loam, silt loam, silty clay loam, or clay.

The C horizon, where it occurs, has hue of 5YR to 10YR, value of 4 to 8, and chroma 4 to 8. It is silt loam, silty clay loam, and clay.

DsA—Duffield silt loam, 0 to 3 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Duffield and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Swanpond and similar soils

Composition: 6 percent
Landform: Upland flats

Funkstown and similar soils

Composition: 4 percent
Landform: Drainageways

Ryder and similar soils

Composition: 3 percent
Landform: Summits and backslopes

Opequon and similar soils

Composition: 2 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DsB—Duffield silt loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Duffield and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches
Note: On shoulders and convex backslopes, on about 5 percent of this map unit, bedrock is at a depth of less than 60 inches.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Opequon and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Ryder and similar soils

Composition: 5 percent

Landform: Summits and backslopes

Swanpond and similar soils

Composition: 3 percent
Landform: Saddles and swales

Funkstown and similar soils

Composition: 2 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DsC—Duffield silt loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Duffield and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

Additional Components

Ryder and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Opequon and similar soils

Composition: 5 percent
Landform: Summits and backslopes

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DsD—Duffield silt loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Duffield and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 15 to 25 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Ryder and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Opequon and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DuB—Duffield silt loam, 3 to 8 percent slopes, very rocky

Map Unit Setting

Landscape: Karst landscapes
Note: Small areas of rock outcrops are on summits and shoulders.

Component Description

Duffield and similar soils

Composition: 80 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Ryder and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Opequon and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Swanpond and similar soils

Composition: 3 percent
Landform: Saddles and swales

Funkstown and similar soils

Composition: 2 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DuC—Duffield silt loam, 8 to 15 percent slopes, very rocky

Map Unit Setting

Landscape: Karst landscapes
Note: Small areas of rock outcrops are on some summits and shoulders.

Component Description

Duffield and similar soils

Composition: 80 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Opequon and similar soils

Composition: 10 percent
Landform: Ridges

Ryder and similar soils

Composition: 10 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DvB—Duffield-Rock outcrop complex, 3 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Duffield and similar soils

Composition: 45 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone

Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 40 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at or above the surface
Parent material: Shaly limestone
Flooding: None

Additional Components

Opequon and similar soils

Composition: 10 percent
Landform: Ridges

Ryder and similar soils

Composition: 5 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DvC—Duffield-Rock outcrop complex, 8 to 15 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Duffield and similar soils

Composition: 45 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 40 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at or above the surface
Parent material: Loamy residuum derived from shaly limestone
Flooding: None

Additional Components

Opequon and similar soils

Composition: 10 percent
Landform: Ridges

Ryder and similar soils

Composition: 5 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DvD—Duffield-Rock outcrop complex, 15 to 25 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Duffield and similar soils

Composition: 45 percent
Landform: Summits and backslopes
Slope: 15 to 25 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more

Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 40 percent
Landform: Summits and backslopes
Slope: 15 to 25 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at or above the surface
Parent material: Loamy residuum derived from shaly limestone
Flooding: None

Additional Components

Opequon and similar soils

Composition: 10 percent
Landform: Ridges

Ryder and similar soils

Composition: 5 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Fairplay Series

The Fairplay series consists of very deep, very poorly drained soils. Permeability is moderately slow or slow. These soils formed in alluvial and lacustrine, calcareous marl sediments. They are on active flood plains and at the heads of limestone springs. Slopes range from 0 to 3 percent.

Fairplay soils are similar to Lappans soils and are mapped adjacent to Combs, Lindside, and Melvin soils. Lappans soils are moderately well drained and are rapidly permeable. Combs, Linside, and Melvin soils formed in alluvium that derived from limestone, not marl.

Typical pedon of Fairplay (marl) silt loam, in pasture, about 0.5 mile north of intersection of MD-63 and Reichard Road and 50 feet east of Riechard Road; near Spielman; lat. 39 degrees 32 minutes 21 seconds N. and long. 77 degrees 45 minutes 36 s W.

Ap—0 to 11 inches; darkish grayish brown (10YR 3/2) marly silt loam; weak fine subangular structure; friable; many fine and medium and common coarse roots; 5 percent gastropod shells; violently effervescent; slightly alkaline; abrupt smooth boundary.

Ag—11 to 15 inches; olive gray (5Y 5/2) marly silt loam; weak fine subangular blocky structure; very friable; many fine and common medium and few coarse roots; 5 percent gastropod shells; violently effervescent; moderately alkaline; abrupt smooth boundary.

Bg—15 to 20 inches; grayish brown (10YR 5/2) and light gray (5Y 5/2) marly sandy loam; weak and moderate subangular blocky structure; very friable; many fine and few medium roots; many fine and medium tubular pores and common fine and common medium vesicular pores; few medium distinct dark grayish brown (10YR 4/2) organic material filling krotovinas; few medium prominent strong brown (7.YR 4/6) iron accumulations; 4 percent gastropod shells; violently effervescent; moderately alkaline; clear wavy boundary.

Abg—20 to 27 inches; olive gray (5Y 5/2) marly silt loam; moderate medium subangular structure; friable; common fine roots; many fine and few medium tubular pores; few fine faint light olive gray (5Y 6/2) iron depletions; 5 percent gastropod shells (3 percent crushable); violently effervescent; moderately alkaline; abrupt smooth boundary.

Bkb1—27 to 36 inches; light gray (10YR 7/2) marly sandy loam; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; very friable; few fine roots; many fine and common medium tubular pores and few medium vesicular pores; 3 percent gastropod shells and secondary pendants; violently effervescent; moderately alkaline; gradual wavy boundary.

Bkb2—36 to 40 inches; light gray (10YR 7/2) marly sandy loam; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; very friable; few fine roots; many fine and common medium tubular pores and few medium vesicular pores; few fine prominent red (2.5YR 4/2) iron depletions; 4 percent gastropod shells and common medium carbonate pipestems and nodules; violently effervescent; moderately alkaline; clear wavy boundary.

Abg2—40 to 47 inches; gray (10YR 5/1) marly silt loam; weak medium subangular blocky structure; very friable; few fine faint brown (10YR 5/3) iron depletions; 5 percent gastropod shells; violently effervescent; moderately alkaline; clear wavy boundary.

Bkb3—47 to 53 inches; light gray (10YR 7/2) marly sandy loam; moderate medium subangular blocky structure parting to weak fine granular; very friable; many fine and common medium tubular pores and few medium vesicular pores; few fine faint gray (10YR 6/1) iron depletions; few fine distinct yellowish brown (10YR 5/6) iron concentrations; 4 percent gastropod shells; violently effervescent; moderately alkaline.

Bkm—53 to 60 inches; light gray (10YR 7/2) marly loamy sand; massive; very firm; few fine tubular pores; common medium prominent red (2.5YR 5/8) iron concentrations; common medium prominent very dark gray (N 3/0) iron depletions; 5 percent gastropod shells; common medium and coarse cemented pipestems and nodules; violently effervescent; moderately alkaline.

Abg3—60 to 68 inches; very dark gray (10YR 3/1) marly sandy loam; weak medium subangular blocky structure; friable; common medium distinct light gray (10YR 7/1) iron depletions; 5 percent gastropod shells; violently effervescent; moderately alkaline; clear wavy boundary.

Bkb4—68 to 79 inches; light gray (2.5Y 7/2) marly sandy loam; weak coarse prismatic structure parting to weak medium subangular blocky; very friable; few fine and medium tubular pores; common medium faint pale yellow (2.5YR 7/4) iron depletions; 4 percent gastropod shells; common medium and coarse secondary carbonate pipestems and nodules; violently effervescent; moderately alkaline.

The solum ranges from 20 to 90 inches in thickness. Depth to bedrock is more than 60 inches. The mollic epipedon ranges from 10 to 24 inches in thickness. The marl deposits range from 4 to 15 feet in thickness. The $CaCo_3$ equivalent is more than 40 percent in the uppermost 20 inches of these soils. Soil reaction is neutral to moderately alkaline.

The Ap and A horizons have hue of 10YR to 5Y, value of 2 or 3, and chroma of 1 to 3. They are marly silt loam or marly loam. Gastropod shells and secondary pendants range from 0 to 10 percent. Gravel ranges from 0 to 10 percent. Reaction ranges from neutral to moderately alkaline.

The Abg horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 or 2. It is the marly analog of silt loam, silty clay loam, loam, or sandy loam. Gastropod shells and secondary pendants range from 5 to 25 percent. Gravel ranges from 0 to 15 percent and cobbles range from 0 to 3 percent. Reaction ranges from neutral to moderately alkaline.

The Bg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 to 3. It is the marly analog of sandy loam, loam, clay loam, or silt loam. Gastropod shells and secondary pendants range from 5 to 30 percent, gravel ranges from 0 to 15 percent, and cobbles range from 0 to 3 percent. Reaction is neutral or moderately alkaline.

The Bkb and Bkm horizons have hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 to 3. They are the marly analog of sandy loam, loam, clay loam, or silt loam. Gastropod shells and secondary pendants range from 5 to 30 percent, gravel ranges from 0 to 15 percent, and cobbles range from 0 to 3 percent. Reaction ranges from moderately alkaline through strongly alkaline.

The 2Bt horizon, where it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is the marly analog of silty clay loam, clay loam, or clay. Rock fragments range from 5 to 15 percent. Reaction is neutral or slightly alkaline.

The Ckb horizon, where it occurs, has hue of 10YR to 5Y, value 4 to 7, and chroma 1 to 2. It is the marly analog of sandy loam, loam, clay loam, or silt loam. Gastropod shells and secondary pendants range from 5 to 30 percent, of which 20 to 25 percent are crushable. Gravel ranges from 0 to 15 percent and cobbles range from 0 to 5 percent. Reaction ranges from moderately alkaline through strongly alkaline.

The 2C horizon, where it occurs, has hue of 7.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is the marly analog of silty clay loam, clay loam, or clay. Rock fragments range from 5 to 10 percent. Reaction is neutral or slightly alkaline.

Fa—Fairplay (marl) silt loam

Map Unit Setting

Landscape: River valleys
Note: In some areas water ponds for long durations.

Component Description

Fairplay and similar soils

Composition: 80 percent
Landform: Flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Marly silt loam
Drainage class: Very poorly drained
Parent material: Marl deposits
Flooding: Frequent
Water table: At the soil surface
Ponding duration: Long
Available water capacity: Average of 7.5 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Lappans and similar soils

Composition: 10 percent
Landform: Flood plains

Combs and similar soils

Composition: 5 percent
Landform: Flood plains

Lindside and similar soils

Composition: 5 percent
Landform: Flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Foxville Series

The Foxville series consists of very deep, somewhat poorly drained soils. Permeability is moderately slow. These soils formed in alluvium and colluvium derived from mixed greenstone, greenstone schist, quartzite, and phyllite rocks on flood plains. Slopes range from 0 to 8 percent.

Foxville soils are similar to Codorus, Deposit, and Hatboro soils, and are mapped adjacent to Catoctin, Lantz, Highfield, Mt. Zion, Myersville, Ravenrock, Rohrersville, Thurmont, and Trego soils. Codorus soils are moderately well drained and have fewer rock fragments in the upper part than Foxville soils. Deposit soils formed in sandstone and shale. Hatboro soils are poorly drained and have fewer rock fragments in the upper part than Foxville soils. Catoctin, Highfield, Lantz, Mt. Zion, Myersville, Ravenrock, Rohrersville, Thurmont, and Trego soils all are on surrounding uplands and are not subject to flooding.

Typical pedon of Foxville cobbly silt loam, in an area of Foxville and Hatboro soils, on a very rubbly 2 percent slope on a forested flood plain, about 0.9 mile east of Foxville on MD-77; 200 feet north of MD-77 in Catoctin Mountain National Park; lat. 39 degrees 33 minutes 10 seconds N. and long. 77 degrees 28 minutes 44 seconds W.

Oi—0 to 3 inches; partly decomposed leaves and twigs; 55 percent stone cover.

A—3 to 4 inches; very dark gray (10YR 3/1) cobbly silt loam; weak fine granular structure; friable; many coarse roots throughout; 20 percent cobbles and 10 percent stones; extremely acid; abrupt wavy boundary.

Bw1—4 to 22 inches; light yellowish brown (2.5Y 6/4) cobbly silt loam; moderate medium subangular blocky structure; friable; many fine medium and coarse roots throughout; common fine distinct light olive gray (5Y 6/2) iron depletions; few fine prominent dark brown (7.5YR 3/3) iron stains on faces of peds; 25 percent cobbles, 15 percent stones, and 10 percent gravel; extremely acid; clear wavy boundary.

Bg1—22 to 29 inches; light greenish gray (5GY 7/1) very cobbly silt loam; moderate medium subangular blocky structure; friable; common fine and medium roots throughout; common fine tubular pores; many fine prominent dark brown (7.5YR 3/3) iron stains on faces of peds; many fine prominent yellowish brown (10YR 5/6) iron accumulations between peds; common fine faint greenish gray (5GY 6/1) iron depletions in pores and along roots; 45 percent cobbles and 10 percent gravel; moderately acid; clear wavy boundary.

Bg2—29 to 43 inches; light greenish gray (5GY 7/1) very cobbly silt loam; weak coarse subangular blocky structure; firm; common fine and few medium roots throughout; many medium prominent strong brown (7.5YR 5/8) iron accumulations; 45 percent cobbles and 10 percent gravel; moderately acid; abrupt smooth boundary.

2BC—43 to 58 inches; dark yellowish brown (10YR 4/4) silt loam; weak very coarse prismatic structure parting to moderate medium platy; firm; common fine roots in cracks; few medium and coarse vesicular pores and common fine and medium tubular pores; common coarse prominent light greenish gray (5GY 7/1) iron depletions in pores; common medium distinct yellowish brown (10YR 5/6) iron accumulations; common medium prominent dark brown (7.5YR 3/3) iron stains on faces of peds; 5 percent gravel; moderately acid.

The solum ranges from 25 to 60 inches in thickness. Depth to bedrock is more than 6 feet. Reaction ranges from moderately acid to extremely acid throughout the pedon. Rock fragments range from 20 to 70 percent on the surface, from 15 to 35 percent in the surface layer, from 20 to 55 percent in the solum, and from 5 to 20 percent in the substratum.

The A horizon has hue of 10YR to 5Y, value 2 to 4, and chroma 1 to 4. It is silt loam, loam, or their cobbly or stony analogs.

The Bg and B horizons have hue of 10YR to 5GY, value 4 to 7, and chroma 1 to 6. They are silt loam, loam, clay loam, silty clay loam, or their cobbly analog.

The BC horizon and 2BC horizon, where it occurs, have hue of 7.5YR or 10YR, value 4 to 6, and chroma of 3 to 8. They are loam, clay loam, or silt loam.

FO—Foxville and Hatboro soils

Map Unit Setting

Landscape: River valleys

Component Description

Foxville and similar soils

Composition: 55 percent
Landform: Narrow, high-gradient flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Cobbly silt loam
Drainage class: Somewhat poorly drained
Parent material: Gravelly alluvium derived from quartzite, phyllite, or greenstone.
Flooding: Occasional
Water table: 0.5 to 1.5 feet
Available water capacity: Average of 4.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Hatboro and similar soils

Composition: 40 percent
Landform: Flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Drainage class: Poorly drained
Parent material: Gravelly alluvium derived from phyllite, quartzite, or greenstone
Flooding: Common
Water table: 0.0 to 0.5 feet
Available water capacity: Average of 8.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Ravenrock and similar soils

Composition: 5 percent
Landform: Backslopes and footslopes on mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Funkstown Series

The Funkstown series consists of very deep, moderately well drained soils. Permeability is moderate. These soils formed in local alluvium eroded from surrounding uplands over residuum derived from limestone. They are in concave drainageways on uplands. Slopes range from 0 to 3 percent.

Funkstown soils are similar to Lindside soils and are mapped adjacent to Braddock, Combs, Deposit, Downsville, Dryrun, Duffield, Fairplay, Hagerstown, Lappans, Murrill, Melvin, Nollville, Ryder, Swanpond, and Walkersville soils. Braddock and Murrill soils formed in colluvial deposits over limestone, are well drained, and are not subject to flooding. Combs, Deposit, Fairplay, Lappans, Lindside, and Melvin soils all are on flood plains near perennial streams. Duffield, Hagerstown, Nollville, and Ryder soils are on adjacent limestone uplands, are not subject to flooding, and are well drained. Dryrun soils formed in old, alluvial fan deposits on broad alluvial fans and are not subject to flooding. Swanpond soils are on adjacent footslopes and headslopes, are not subject to flooding, and have a clayey solum. Downsville and Walkersville soils are on old stream terraces, are well drained, and are not subject to flooding.

Typical pedon of Funkstown silt loam, on a 1 percent slope, in an idle field, about 350 feet north of Londontown Drive and 0.5 mile east of Fairview Meadows Blvd. and Londontown Drive; east of Funkstown; lat. 39 degrees 36 minutes 39 seconds N. and long. 77 degrees 40 minutes 19 seconds W.

Ap1—0 to 4 inches; brown or dark yellowish brown (10YR 4/4) silt loam; moderate medium granular structure parting to moderate medium subangular blocky; friable; many fine and medium roots; few fine tubular pores; 5 percent gravel; neutral; clear wavy boundary.

Ap2—4 to 12 inches; dark brown (7.5YR 4/4) silt loam; weak medium platy structure parting to moderate medium subangular blocky; friable; many fine and few medium roots; common fine and medium tubular pores; 8 percent gravel; neutral; abrupt smooth boundary.

BE—12 to 22 inches; strong brown (7.5YR 5/6) gravelly silt loam; moderate medium subangular blocky structure; friable; common fine roots; common fine and medium and few coarse tubular pores and few medium vesicular pores; 20 percent gravel; neutral; clear wavy boundary.

Bt1—22 to 29 inches; strong brown (7.5YR 5/6) very gravelly loam; weak medium subangular blocky structure; friable; common fine roots; common fine and few medium tubular pores and common fine vesicular pores; few medium faint strong brown (7.5YR 5/8) iron accumulations; common distinct clay films and clay bridging in pores and between rock fragments; 50 percent gravel; slightly acid; clear wavy boundary.

2Bt2—29 to 45 inches; strong brown (7.5YR 5/6) silty clay loam; few medium distinct brownish yellow (10YR 6/6) lithochromic mottles; moderate medium subangular blocky structure parting to weak fine platy; friable; few fine roots; common fine and medium tubular and vesicular pores; many coarse prominent very dark gray (5YR 3/1) manganese stains and concretions on faces and interiors of peds; many distinct clay films on faces of peds and in pores; few coarse krotovinas; 16 percent channers; slightly acid; clear wavy boundary.

2BC—45 to 63 inches; yellowish brown (10YR 5/8) channery silt loam; moderate medium platy structure; friable; few fine roots; many coarse prominent very dark gray (5YR 3/1) manganese stains; many distinct discontinuous strong brown (7.5YR 5/6) clay films on faces of peds and on rock fragments; 16 percent channers; slightly acid; clear wavy boundary.

2C—63 to 80 inches; variegated brownish yellow (10YR 6/8), yellowish red (5YR 5/8), and yellowish brown (10YR 5/8) channery silt loam; moderate medium platy structure derived from bedrock; friable; common fine tubular pores; many coarse prominent very dark gray (5YR 3/1) manganese stains; common coarse prominent reddish yellow (5YR 6/6) iron accumulations; 30 percent channers of which 20 percent are crushable; slightly acid.

The solum ranges from 40 to 70 inches in thickness. The A horizon commonly ranges from 8 to 15 inches thick, but ranges to 22 inches in some places. Lithic contact is at a depth of more than 72 inches. Depth to the underlying residuum ranges from 25 to 60 inches. Chert, sandstone, and limestone gravel ranges from 0 to 25 percent in the Ap horizon and from 10 to 60 percent in individual subhorizons of the Bt horizon; the average is less than 35 percent. In the 2Bt and 2C horizons fragments predominantly of limestone range from 5 to 25 percent. Reaction ranges from moderately acid to slightly alkaline throughout the profile.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 or 4. It is silt loam, loam, or silty clay loam. Reaction ranges from slightly acid to slightly alkaline.

The BE horizon has hue of 7.5YR to 10YR, value of 4 to 6, and chroma of 4 to 6. It is silt loam or loam. Reaction is slightly acid or neutral.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is clay loam, loam, or silt loam. Reaction is slightly acid or neutral.

The 2Bt horizon has hue of 5YR to 7.5YR, value of 4 to 8, and chroma of 4 to 8. It is silt loam, loam, clay loam, or silty clay loam. It ranges from moderately acid to neutral.

The 2BC horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is silt loam, loam, clay loam, or silty clay loam, but in some pedons the range includes clay.

The 2C horizon has hue of 5YR to 2.5Y, value of 4 to 8, and chroma of 4 to 8. It is silt loam, loam, clay loam, or silty clay loam, but in some pedons the range includes clay. Reaction ranges from moderately acid to neutral.

Ft—Funkstown silt loam

Map Unit Setting

Landscape: Karst landscapes (fig. 18)

Component Description

Funkstown and similar soils

Composition: 80 percent
Landform: Drainageways
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Drainage class: Moderately well drained
Parent material: Loamy alluvium and colluvium over limestone
Flooding: Frequent
Water table: 2.0 to 3.5 feet
Available water capacity: Average of 9.4 inches
Note: Parts of this map unit have a poorly expressed argillic horizon.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Duffield and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Hagerstown and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Opequon and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Ryder and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Hagerstown Series

The Hagerstown series consists of very deep, well drained soils. Permeability is moderate. These soils formed in residuum derived from limestone. They are on uplands in the central limestone valley. Slopes range from 0 to 25 percent.

Hagerstown soils are similar to Duffield soils and are mapped adjacent to Dryrun, Funkstown, Murrill, Nollville, Opequon, Pecktonville, Ryder, and Swanpond soils. Dryrun and Funkstown soils formed in local alluvium and colluvium and are moderately well drained. Duffield and Nollville soils formed in residuum derived from limestone. They average less than 35 percent clay throughout. Pecktonville soils have chert fragments throughout the solum, are slowly permeable, and have a seasonal high water table below a depth of 40 inches. Opequon and Ryder soils are shallower to bedrock than Hagerstown soils. Swanpond soils have a clayey solum, are slowly permeable, and are moderately well drained. Murrill soils formed in colluvium over limestone and are lighter in texture and have more rock fragments in the solum than Hagerstown soils. Limestone outcrops are common on the same landscape as Hagerstown soils.

Typical pedon of Hagerstown silt loam, 3 to 8 percent slopes, in a west-facing, convex, cultivated field, about 2,300 feet north of intersection of Wheeler Road and MD-34; 1,200 feet east of Wheeler Road; near Keedysville; lat. 39 degrees 30 minutes 3 seconds N. and long. 77 degrees 41 minutes 13 seconds W.

Ap1—0 to 7 inches; dark brown or brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; many fine and common medium roots; many fine and common medium tubular pores; neutral; abrupt smooth boundary.

Ap2—7 to 10 inches; dark brown or brown (7.5YR 4/4) silt loam; weak coarse platy structure; firm; many fine and few medium roots; common fine and medium tubular pores; 1 percent limestone channers; neutral; abrupt smooth boundary.

BE—10 to 17 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; common fine and few medium roots; many fine and medium tubular and vesicular pores; common medium distinct dark brown or brown (7.5YR 4/2) organic films in pores; few distinct discontinuous clay skins in pores, neutral; clear wavy boundary.

Bt1—17 to 26 inches; reddish brown (5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; many fine and medium vesicular and tubular pores; common medium distinct very dark gray (5YR 3/1) manganese stains on faces of peds and interiors of peds; common fine distinct very dark gray (5YR 3/1) manganese concretions; many medium dark brown or brown (7.5YR 4/3) organic films in pores; many distinct continuous clay films on faces of peds and in pores; 5 percent limestone channers; slightly acid; clear wavy boundary.

Bt2—26 to 45 inches; reddish brown (2.5YR 4/4) silty clay; strong fine subangular blocky structure; friable; common fine roots; many fine and medium tubular and vesicular pores; many fine and medium distinct very dark gray (5YR 3/1) manganese stains; common fine distinct very dark gray (5YR 3/1) manganese concretions; common medium distinct brown (7.5YR 4/3) organic films in pores; many prominent continuous clay films on faces of peds and in pores; 5 percent limestone channers; slightly acid; gradual wavy boundary.

Bt3—45 to 61 inches; red (2.5YR 4/6) clay; common medium distinct brownish yellow (10YR 6/8) lithochromic mottles; strong fine platy structure; friable; common fine and few medium roots; many fine and medium tubular and vesicular pores; many medium distinct very dark gray (5YR 3/1) manganese stains; common prominent continuous clay films on faces of peds and in pores; 5 percent

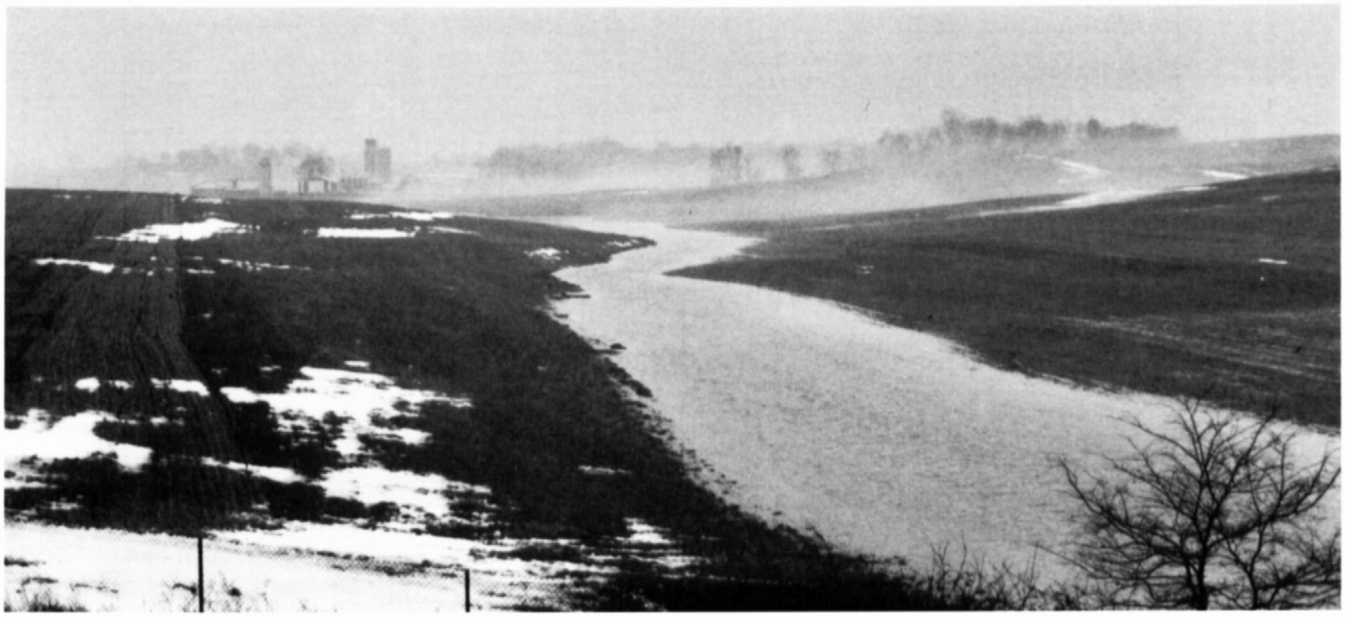

Figure 18.—Typical landscape of Funkstown silt loam. Flooding is a severe limitation to building on this soil.

limestone channers; neutral; gradual wavy boundary.

BC—61 to 71 inches; variegated yellowish brown (10YR 5/8), yellowish red (5YR 4/6), dark brown or brown (7.5YR 4/3) silty clay loam; weak medium subangular blocky structure; friable; common fine roots; common fine and few medium tubular and vesicular pores; common distinct discontinuous clay skins on faces of peds; 10 percent limestone channers; slightly acid.

The solum ranges from 40 to 80 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments range from 0 to 20 percent throughout. The soil is slightly acid or neutral in the solum and ranges from moderately acid to neutral in the substratum.

The Ap horizon has a hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 4. It is silt loam, silty clay loam, clay loam, or loam.

The BE horizon has hue of 5YR to 10YR, value of 4 to 5, and chroma of 4 to 8. It is silt loam, loam, silty clay loam, clay loam, clay, or silty clay.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is silty clay loam, silty clay, clay, or loam.

The BC horizon has hue of 2.5YR to 10YR, value 4 to 8, and chroma 4 to 8. It is silt loam, silty clay loam, silty clay, clay, or loam.

HaA—Hagerstown silt loam, 0 to 3 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Hagerstown and similar soils

Composition: 85 percent
Landform: Upland flats
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 80 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches
Note: Some pedons do not have the required decrease of clay to fit the central concept of the Hagerstown series.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Opequon and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Ryder and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Swanpond and similar soils

Composition: 3 percent
Landform: Saddles and swales

Funkstown and similar soils

Composition: 2 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HaB—Hagerstown silt loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: In some eroded areas the surface texture is heavier than described. Active and inactive sinkholes make up 5 percent of some map units.

Component Description

Hagerstown and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 80 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Opequon and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Ryder and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Swanpond and similar soils

Composition: 3 percent
Landform: Upland flats

Funkstown and similar soils

Composition: 2 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HaC—Hagerstown silt loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: In some eroded areas the surface texture is heavier than described. Active and inactive sinkholes make up 5 percent of some map units.

Component Description

Hagerstown and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 80 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Opequon and similar soils

Composition: 10 percent
Landform: Ridges

Ryder and similar soils

Composition: 5 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HaD—Hagerstown silt loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: In eroded areas the surface texture is heavier than described.

Component Description

Hagerstown and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 80 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Opequon and similar soils

Composition: 10 percent
Landform: Ridges

Ryder and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HbB—Hagerstown silty clay loam, 3 to 8 percent slopes, very rocky

Map Unit Setting

Landscape: Karst landscapes
Note: In eroded areas the surface texture is heavier than described. Active and inactive sinkholes make up 5 percent of some map units.

Component Description

Hagerstown and similar soils

Composition: 85 percent
Landform: Upland flats
Slope: 3 to 8 percent
Texture of the surface layer: Silty clay loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Opequon and similar soils

Composition: 10 percent
Landform: Ridges

Swanpond and similar soils

Composition: 3 percent
Landform: Saddles and swales

Funkstown and similar soils

Composition: 2 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HbC—Hagerstown silty clay loam, 8 to 15 percent slopes, very rocky

Map Unit Setting

Landscape: Karst landscapes
Note: In eroded areas the surface texture is heavier than described. Active and inactive sinkholes make up 5 percent of some map units.

Component Description

Hagerstown and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Silty clay loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Opequon and similar soils

Composition: 15 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HbD—Hagerstown silty clay loam, 15 to 25 percent slopes, very rocky

Map Unit Setting

Landscape: Karst landscapes
Note: In eroded areas the surface texture is heavier than described. Active and inactive sinkholes make up 5 percent of this map unit.

Component Description

Hagerstown and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 15 to 25 percent
Texture of the surface layer: Silty clay loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Opequon and similar soils

Composition: 15 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HcB—Hagerstown-Rock outcrop complex, 3 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes (fig. 19)
Note: In eroded areas the surface textures are heavier than described. Active and inactive sinkholes make up 5 percent of some map units.

Component Description

Hagerstown and similar soils

Composition: 70 percent
Landform: Ridges
Slope: 3 to 8 percent
Texture of the surface layer: Silty clay loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific

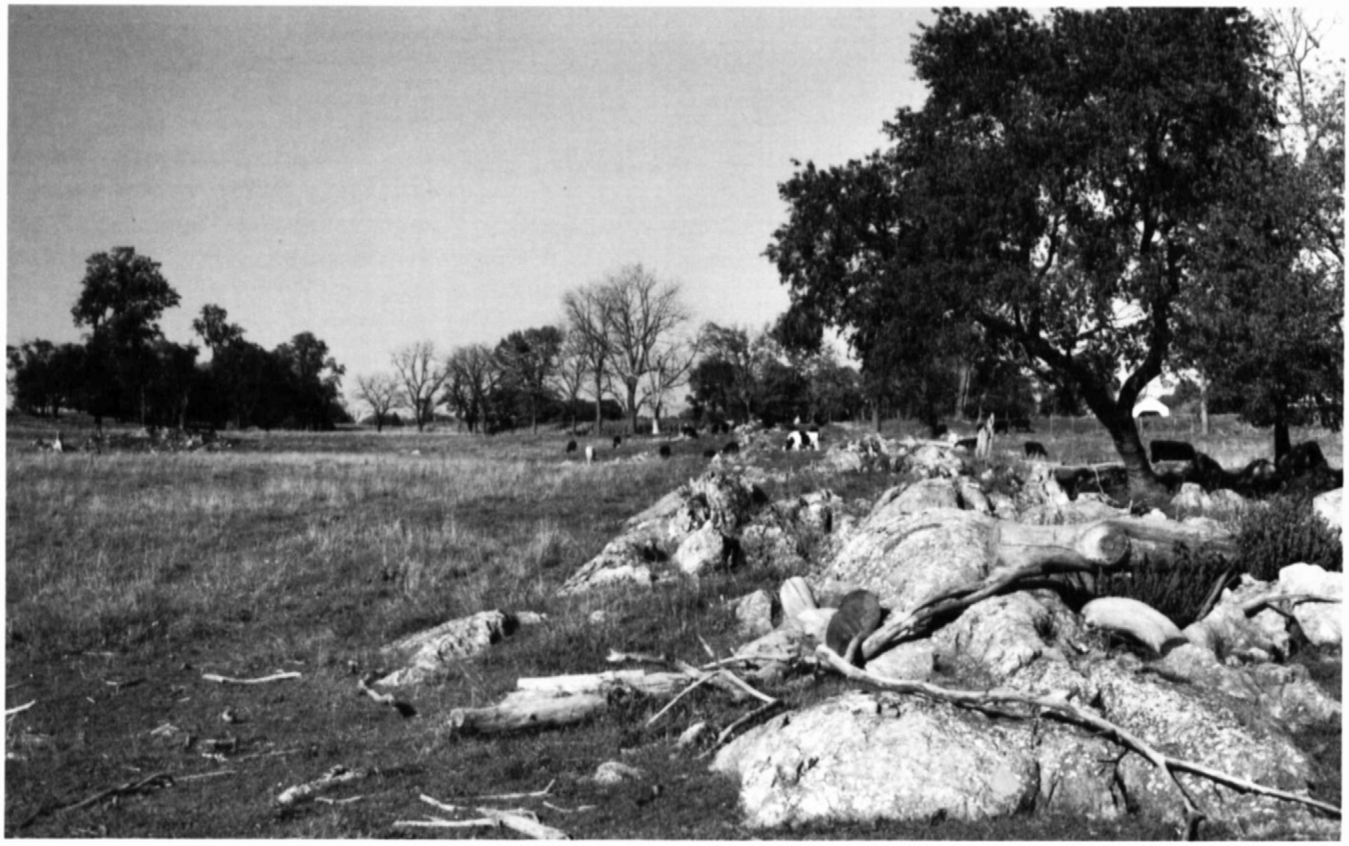

Figure 19.—Typical landscape of Hagerstown-Rock outcrop complex, 3 to 8 percent slopes. In some areas farming is feasible on the Hagerstown soil between rock outcrops.

to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 15 percent
Landform: Ridges
Slope: 3 to 8 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at the surface
Parent material: Limestone
Flooding: None

Additional Components

Opequon and similar soils

Composition: 10 percent
Landform: Ridges

Swanpond and similar soils

Composition: 5 percent
Landform: Saddles and swales

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HcC—Hagerstown-Rock outcrop complex, 8 to 15 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: In eroded areas the surface texture is heavier than described. Active and inactive sinkholes make up 5 percent of some map units.

Component Description

Hagerstown and similar soils

Composition: 70 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Silty clay loam

Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 15 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at a depth of 0 inches
Parent material: Limestone
Flooding: None

Additional Components

Opequon and similar soils

Composition: 10 percent
Landform: Ridges

Ryder and similar soils

Composition: 5 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HcD—Hagerstown-Rock outcrop complex, 15 to 25 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: In eroded areas the surface texture is heavier than described. Active and inactive sinkholes may make up about 5 percent of this map unit.

Component Description

Hagerstown and similar soils

Composition: 70 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Silty clay loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 15 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at a depth of 0 inches
Parent material: Limestone
Flooding: None

Additional Components

Opequon and similar soils

Composition: 10 percent
Landform: Ridges

Ryder and similar soils

Composition: 5 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HdB—Hagerstown-Duffield-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: In some flat areas of the map unit, after storms water ponds because runoff is uncontrolled.

Component Description

Duffield and similar soils

Composition: 35 percent
Landform: Summits and backslopes

Slope: 0 to 8 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

Hagerstown and similar soils

Composition: 35 percent
Landform: Upland flats
Slope: 0 to 8 percent
Texture of the surface layer: Silty clay loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 80 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

Urban land

Composition: 20 percent
Landform: Man-influenced
Slope: 0 to 8 percent
Texture of the surface layer: Concrete and asphalt
Depth to a restrictive feature: Concrete surface
Parent material: Man-influenced
Flooding: None
Water table: 2 feet or more
Available water capacity: None assigned

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Opequon and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Swanpond and similar soils

Composition: 5 percent
Landform: Upland flats

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HdD—Hagerstown-Duffield-Urban land complex, 8 to 25 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Duffield and similar soils

Composition: 35 percent
Landform: Summits and backslopes
Slope: 8 to 25 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Hagerstown and similar soils

Composition: 35 percent
Landform: Upland flats
Slope: 8 to 25 percent
Texture of the surface layer: Silty clay loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 80 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Urban land

Composition: 20 percent
Landform: Man-influenced
Slope: 8 to 25 percent
Texture of the surface layer: Concrete and asphalt
Depth to a restrictive feature: Concrete surface
Parent material: Man-influenced
Flooding: None

Water table: 2 feet or more
Available water capacity: None assigned

Additional Components

Opequon and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HgB—Hagerstown-Opequon-Rock outcrop complex, 0 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: In eroded areas the surface texture is heavier than described. Active and inactive sinkholes make up 5 percent of the map unit.

Component Description

Hagerstown and similar soils

Composition: 40 percent
Landform: Upland flats
Slope: 0 to 8 percent
Texture of the surface layer: Silty clay loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Opequon and similar soils

Composition: 30 percent
Landform: Summits and backslopes
Slope: 0 to 8 percent
Texture of the surface layer: Silty clay loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 12 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 20 percent
Landform: Summits and backslopes
Slope: 0 to 8 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at a depth of 0 inches
Parent material: Limestone
Flooding: None

Additional Components

Funkstown and similar soils

Composition: 5 percent
Landform: Drainageways
Note: Parts of this map unit have thin horizons that have a slight increase in clay.

Swanpond and similar soils

Composition: 5 percent
Landform: Upland flats

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Hatboro Series

The Hatboro series consists of very deep, poorly drained soils. Permeability is moderate. These soils formed in recent alluvium derived from micaceous and phyllitic materials on uplands. They are on flood plains along major streams. Slopes range from 0 to 3 percent.

Hatboro soils are similar to Codorus and Foxville soils and are mapped adjacent to Catoctin, Highfield, Lantz, Mt. Zion, Myersville, and Rohrersville soils. Codorus soils are moderately well drained and typically are in the convex parts of flood plains. Foxville soils are somewhat poorly drained and are more than 35 percent rock fragments throughout. Catoctin, Highfield, Lantz, Mt. Zion, Myersville, and Rohrersville soils are all on surrounding uplands and are not subject to flooding.

Typical pedon of Hatboro silt loam, about 1,000 feet west of MD-67 and 0.5 mile south of Brownsville; lat. 39 degrees 22 minutes 27 seconds N. and long. 77 degrees 40 minutes 17 seconds W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; strong fine granular structure; friable; many fine roots; many fine distinct grayish brown (2.5Y 5/2) iron depletions; many fine prominent yellowish red (5YR 4/6) iron concentrations; many fine prominent yellowish red (5YR 5/8) oxidized rhizospheres; 4 percent gravel; slightly acid; clear smooth boundary.

Bg1—8 to 17 inches; grayish brown (2.5Y 5/2) silt loam; moderate medium subangular blocky structure; friable; many fine roots; common fine and few medium vesicular pores and many fine and few medium tubular pores; many medium prominent strong brown (7.5YR 5/8) oxidized rhizospheres; many medium prominent yellowish red (5YR 4/6) iron concentrations; 2 percent gravel; neutral; clear smooth boundary.

Bg2—17 to 30 inches; light gray (2.5Y 7/2) silt loam; common coarse prominent reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; friable; many fine roots; many fine and few medium tubular pores and common fine and few medium vesicular pores; common fine prominent dark grayish brown (10YR 4/2) organic material in pores; many medium prominent strong brown (7.5YR 5/6) iron concentrations; black (N 2/0) manganese stains on faces of peds; 10 percent quartzite, greenstone, and quartz gravel; neutral; clear smooth boundary.

Bg3—30 to 42 inches; gray (2.5Y 6/1) gravelly clay loam; common fine faint light yellowish brown (2.5Y 6/4) mottles on faces of peds; weak medium subangular blocky structure; firm; few fine roots; common fine tubular pores; many medium prominent yellowish red (5YR 4/6) iron concretions; many medium prominent black (N 2/0) manganese stains on faces of peds; common coarse prominent brownish yellow (10YR 6/8) iron accumulations; 20 percent quartzite, greenstone, and quartz gravel; neutral; clear wavy boundary.

C1—42 to 50 inches; yellowish brown (10YR 5/6) gravelly sandy clay loam; massive; friable; 30 percent quartzite, greenstone, phyllite, and quartz gravel; neutral; abrupt wavy boundary.

C2—50 to 72 inches; yellowish brown (10YR 5/4) very gravelly sandy loam; single grain; very friable; 40 percent quartzite, greenstone, phyllite, and quartz gravel; slightly acid.

The solum is 30 to 40 inches in thick. Depth to bedrock is more than 5 feet. Gravel and cobbles range from 0 to 10 percent in the solum and from 0 to 60 percent in the C horizon. In some pedons individual horizons above a depth of 40 inches are, on average, more than 30 percent rock fragments. In some pedons mica flakes are in the lower part of the profile. Reaction ranges from moderately acid to neutral.

The A horizon has hue of 10YR, value of 3 to 4, and chroma of 2 or 3. It is silt loam or loam.

The Bg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 0 or 2. It is silt loam, clay loam, silty clay loam, sandy clay loam, loam, or their gravelly analog.

The C horizon has variegated hue of 10YR to 5Y or is neutral; value of 4 to 7, and chroma of 0 to 6. It is gravelly or very gravelly sandy clay loam, sandy loam, clay loam, silty clay loam, or silt loam.

Hh—Hatboro silt loam

Map Unit Setting

Landscape: River valleys
Note: On about 5 percent of the map unit water ponds in depressions for long durations. In places along Israel Creek the surface is stony.

Component Description

Hatboro and similar soils

Composition: 85 percent
Landform: Flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Drainage class: Poorly drained
Parent material: Loamy alluvium derived from greenstone, quartzite, phyllite, or schist
Flooding: Common
Water table: 0.0 to 0.5 feet
Available water capacity: Average of 9.0 inches
Note: In some areas a gravelly horizon is common above a depth of 40 inches.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Codorus

Composition: 10 percent
Landform: Flood plains

Unnamed well drained soils

Composition: 5 percent
Landform: Flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Hazel Series

The Hazel series consists of moderately deep, well drained soils. Permeability is moderately rapid. These soils formed in residuum derived from a mixture of phyllite and quartzite. They are on upland ridges of low relief in Pleasant Valley in Washington County. Slopes range from 3 to 45 percent.

Hazel soils are similar to Talladega and Catoctin soils and are mapped adjacent to Bagtown, Braddock, Highfield, Mt. Zion, Myersville, Rohrersville, Talladega, Thurmont, Trego, and Weverton soils. Talladega soils average more than 35 percent rock fragments throughout, have slightly more clay in the solum than Hazel soils, and in some pedons have bedrock at a depth of less than 20 inches. Bagtown, Braddock, Thurmont, Trego, and Weverton soils all formed in colluvium of quartzite over phyllite or limestone, and have bedrock at a depth of more than 40 inches. Catoctin, Highfield, Mt. Zion, Myersville, and Rohrersville soils formed in material derived from greenstone.

Typical pedon of Hazel channery silt loam, 3 to 8 percent slopes, about 900 feet west of Hoffmaster Road, 1,200 feet east of intersection of Harpers Ferry Road and Hoffmaster Road; near Dargan; lat. 39 degrees 22 minutes 6 seconds N. and long. 77 degrees 43 minutes 6 seconds W.

Ap—0 to 10 inches; brown (7.5YR 4/4) channery silt loam; moderate fine subangular blocky structure; friable; many fine roots; few fine tubular pores; 20 percent channers; neutral; abrupt wavy boundary.

Bw1—10 to 20 inches; strong brown (7.5YR 5/6) channery loam; moderate medium subangular blocky structure; friable; many fine roots; common fine tubular pores and few fine and medium vesicular pores; common discontinuous clay films on rock fragments and in pores; 20 percent channers; moderately acid; clear wavy boundary.

C—20 to 27 inches; yellowish brown (10YR 5/6) channery loam; massive; friable; common fine roots; few fine tubular pores and common fine and few medium vesicular pores; 25 percent channers; strongly acid; abrupt wavy boundary.

R—27 to 77 inches; strongly cemented phyllite of the Harpers Ferry formation.

The solum ranges from 14 to 28 inches in thickness. Depth to hard bedrock ranges from 20 to 40 inches and varies widely within short, horizontal distances. Channers range from 0 to 30 percent in the A and Bw horizons and from 20 to 50 percent in the C horizon. In unlimed areas reaction is strongly acid or very strongly acid.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. It is loam or silt loam.

The Bw horizon has hue of 7.5YR to 10YR, value of 4 to 5, and chroma of 4 to 8. It is loam, sandy loam, fine sandy loam, or silt loam.

The C horizon is variegated. It has hue of 7.5YR to 10YR, value of 4 or 5, and chroma of 3 to 8. It is loam or silt loam.

HnB—Hazel channery silt loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Uplands and mountains

Component Description

Hazel and similar soils

Composition: 85 percent
Landform: Summits and backslopes on hills; backslopes and footslopes on mountains
Slope: 3 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from phyllite
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.4 inches
Note: On eroded parts of shoulder slopes bedrock is at a depth of less than 20 inches.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is

available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Braddock and similar soils

Composition: 5 percent
Landform: Undulating, old colluvial fans

Thurmont and similar soils

Composition: 5 percent
Landform: Undulating, old colluvial fans

Trego and similar soils

Composition: 5 percent
Landform: Alluvial fans and stream terraces

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HnC—Hazel channery silt loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Uplands and mountains

Component Description

Hazel and similar soils

Composition: 85 percent
Landform: Summits and backslopes of hills; backslopes and footslopes of mountains
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from phyllite
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.4 inches
Note: On eroded parts of shoulder slopes bedrock is at a depth of less than 20 inches.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Thurmont and similar soils

Composition: 5 percent
Landform: Undulating, old colluvial fans

Trego and similar soils

Composition: 5 percent
Landform: Alluvial fans and stream terraces

Unnamed shallow soils

Composition: 5 percent
Landform: Shoulders

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HnD—Hazel channery silt loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: Mountains
Note: On about 3 percent of the map unit the surface is stony.

Component Description

Hazel and similar soils

Composition: 85 percent
Landform: Shoulders and backslopes of mountains
Slope: 15 to 25 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from phyllite
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.3 inches
Note: On eroded parts of shoulder slopes bedrock is at a depth of less than 20 inches.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Thurmont and similar soils

Composition: 5 percent
Landform: Undulating, old colluvial fans

Trego and similar soils

Composition: 5 percent
Landform: Alluvial fans and stream terraces

Unnamed shallow soils

Composition: 5 percent

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HrE—Hazel-Rock outcrop complex, 25 to 45 percent slopes

Map Unit Setting

Landscape: Mountains
Note: On about 5 percent of the map unit the surface is stony.

Component Description

Hazel and similar soils

Composition: 45 percent
Landform: Shoulders and backslopes of mountains
Slope: 25 to 45 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from phyllite
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 40 percent
Landform: Shoulders and backslopes of mountains
Slope: 25 to 45 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at the surface
Parent material: Phyllite
Flooding: None

Additional Components

Airmont and similar soils

Composition: 5 percent
Landform: Head slopes, footslopes, and drainageways on mountains

Unnamed shallow soils

Composition: 5 percent
Landform: Shoulders

Weverton and similar soils

Composition: 5 percent
Landform: Backslopes and footslopes on mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Hazleton Series

The Hazleton series consists of very deep, well drained soils. Permeability is rapid. These soils formed in residuum derived from sandstone that has been altered by soil creep in the upper part of the solum. They are on convex shoulders and on the upper part of backslopes of ridges capped by sandstone. Slopes range from 15 to 65 percent.

Hazleton soils are similar to Bagtown soils and are mapped adjacent to Dekalb soils. Commonly, Sideling soils are on adjacent, lower landscapes. Bagtown soils formed in deep colluvium and are moderately well drained. Dekalb soils are moderately deep to hard, sandstone bedrock. Sideling soils formed in colluvium derived from sandstone, are slowly permeable, and are moderately well drained. Sandstone outcrops commonly are mapped adjacent to Hazleton soils.

Typical pedon of Hazleton channery sandy loam, 25 to 45 percent slopes, extremely stony, about 300 feet south of intersection of MD-40 and the summit of Sideling Hill; near Harvey; lat. 39 degrees 41 minutes 9 seconds N. and long. 77 degrees 18 minutes 15 seconds W.

Oi—0 to 2 inches; partly decomposed litter of leaves, twigs, and roots; 12 percent subangular sandstone stones.

A—2 to 3 inches; black (10YR 2/1) channery sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; many very fine and fine roots; common fine and medium tubular pores; 20 percent sandstone channers and 12 percent subangular sandstone stones that extend through leaf litter; very strongly acid, clear smooth boundary.

E—3 to 6 inches; gray (10YR 5/1) and 30 percent brown (10YR 5/3) sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; fine and medium tubular pores; 12 percent subangular sandstone stones that extend through leaf litter; very strongly acid; smooth wavy boundary.

Bw1—6 to 15 inches; brownish yellow (10YR 6/6) gravelly loamy sand; weak medium subangular blocky structure; friable, nonsticky and nonplastic; many fine and common medium roots throughout; 20 percent subangular sandstone gravel and 2 percent subangular sandstone channers; very strongly acid, clear irregular boundary.

Bw2—15 to 34 inches; light yellowish brown (10YR 6/4) very channery loamy sand; weak fine and medium subangular blocky structure; very friable, nonsticky and nonplastic; common fine and medium roots throughout; common fine tubular pores; 30 percent angular sandstone channers, 10 percent subangular sandstone gravel, and 2 percent subangular stones; very strongly acid, clear wavy boundary.

BC—34 to 50 inches; 70 percent pale brown (10YR 6/3) and 30 percent very pale brown (10YR 7/3) very gravelly loamy sand; weak medium subangular blocky structure; firm, nonsticky and nonplastic; many fine roots matted around stones; many fine tubular pores; 15 percent angular sandstone flagstones, 30 percent subangular sandstone gravel, and 5 percent subangular sandstone stones; very strongly acid; clear wavy boundary.

C—50 to 69 inches; 80 percent pale brown (10YR 6/3) and 10 percent very pale brown (10YR 7/3) extremely gravelly sand; single grained; loose, nonsticky and nonplastic; common fine roots throughout; 40 percent subangular sandstone gravel and 25 percent angular sandstone channers; very strongly acid.

The solum ranges from 25 to 50 inches in thickness. Depth to bedrock is 40 to 72 inches or more. Gravel, cobbles, stones, and channers make up 10 to 50 percent of the solum and 35 to 80 percent of the substratum. Boulders, stones, cobbles, and flagstones cover about 2 to 45 percent of the surface in some pedons. The control section, on average, is less than 18 percent clay. Reaction ranges from strongly acid to extremely acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 4. It is sandy loam or loam.

The E horizon has hue of 10YR, value of 4 or 5, and chroma of 1 to 4. It is sandy loam or loam.

The Bw horizon has hue of 7.5YR to 10YR, value 4 to 6, and chroma of 4 to 8. It is sandy loam, loam, and loamy sand.

The C horizon has hue of 7.5YR to 10YR, value of 3 to 6, and chroma of 3 to 8. It is sand, loamy sand, sandy loam, and loam.

HsD—Hazleton channery sandy loam, 15 to 25 percent slopes, extremely stony

Map Unit Setting

Landscape: Mountains

Component Description

Hazleton and similar soils

Composition: 80 percent
Landform: Shoulders and backslopes of mountains
Slope: 15 to 25 percent
Texture of the surface layer: Channery sandy loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of more than 60 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from sandstone and shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.9 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Dekalb and similar soils

Composition: 10 percent
Landform: Ridges

Buchanan and similar soils

Composition: 5 percent
Landform: Backslopes and footslopes of mountains

Sideling and similar soils

Composition: 5 percent
Landform: Backslopes and footslopes of mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HsE—Hazleton channery sandy loam, 25 to 45 percent slopes, extremely stony

Map Unit Setting

Landscape: Mountains

Component Description

Hazleton and similar soils

Composition: 85 percent
Landform: Shoulders and backslopes of mountains
Slope: 25 to 45 percent
Texture of the surface layer: Channery sandy loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of more than 60 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from sandstone and shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.9 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Buchanan and similar soils

Composition: 5 percent
Landform: Concave footslopes, toeslopes, and drainageways

Dekalb and similar soils

Composition: 5 percent
Landform: Ridges

Sideling and similar soils

Composition: 5 percent
Landform: Backslopes and footslopes of mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Highfield Series

The Highfield series consists of very deep, well drained soils. Permeability is moderate. These soils formed in material derived from metabasalt, metarhyolite, and metaandesite rocks. They are on summits and backslopes of mountains. Slopes range from 3 to 65 percent.

Highfield soils are similar to Myersville soils and are mapped adjacent to Lantz, Mt. Zion, Ravencock, and Rohrersville soils. Myersville soils are more than 18 percent clay in the subsoil. Lantz and Rohrersville soils are very poorly drained and somewhat poorly drained, respectively. They are in drainageways. Mt. Zion soils are moderately well drained and commonly are in lower landscape positions. Ravenrock soils are more than 35 percent rock fragments in the subsoil. They are seasonally wet in the substratum.

Typical pedon of Highfield gravelly silt loam, 3 to 8 percent slopes, very stony, in an reforested area of white oak, northern red oak, and maple; lat. 39 degrees 40 minutes 48 seconds N. and long. 77 degrees 29 minutes 2 seconds W.

Oi—0 to 1 inch; partly decomposed leaves and twigs.

Ap—1 to 3 inches; dark grayish brown (2.5Y 4/2) gravelly silt loam; weak fine subangular blocky structure; friable; many fine roots and few medium roots; 25 percent gravel; 1 percent stones; extremely acid; abrupt smooth boundary.

BE—3 to 13 inches; light olive brown (2.5Y 5/6) gravelly loam; moderate fine and weak medium subangular blocky structure; friable; many fine, common medium, and few coarse roots; 20 percent gravel; very strongly acid; clear smooth boundary.

Bt1—13 to 21 inches; strong brown (7.5YR 5/6) gravelly loam; few medium distinct olive brown (2.5Y 4/6) mottles, moderate medium subangular blocky structure; friable; many fine and common medium roots; common fine tubular and vesicular pores; common faint discontinuous clay films on faces of peds; 15 percent gravel; very strongly acid; clear smooth boundary.

Bt2—21 to 39 inches; yellowish red (5YR 5/6) gravelly loam; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; many fine and common medium roots; many fine and few medium tubular and many fine vesicular pores; common distinct discontinuous strong brown (7.5YR 4/6) clay films on faces of peds; many medium black (N 2/0) manganese stains; 15 percent gravel; strongly acid; clear wavy boundary.

CB—39 to 64 inches; variegated strong brown (7.5YR 5/6), yellowish red (5YR 5/6), dark yellowish brown (10YR 5/6), and red (2.5YR 5/6) gravelly loam; weak thick platy structure derived from paralithic contact; friable; common fine and few medium roots; many fine tubular and vesicular pores; few distinct discontinuous clay films on surface of rock fragments; 15 percent channers; strongly acid; abrupt smooth boundary.

Cr—64 to 70 inches; variegated light olive brown (2.5Y 5/4), olive brown (2.5Y 4/4), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/8) extremely channery loam; moderately cemented; weak thick platy structure derived from paralithic contact; firm; few faint discontinuous clay films on faces of plates; 60 percent parachanners and 20 percent channers of chloritic metabasalt.

The solum ranges from 20 to 40 inches in thickness. Depth to bedrock ranges from 40 to 80 inches. Rock fragments of chloritic metabasalt, metarhyolite, metaandesite, and quartz range, by volume, from 5 to 25 percent in the surface horizon, from 15 to 40 percent in the B horizon, and from 20 to 80 percent in the C horizon. The soils are very strongly acid or strongly acid in the surface layer and in the upper part of the B horizon and strongly acid to moderately acid in the lower part of the B horizon and in the C horizon.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 or 2. It is silt loam or loam.

The E horizon, where it occurs, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 4. It is silt loam or loam.

The B horizon has hue of 7.5YR to 2.5Y, value or 5 or 6, and chroma of 4 to 6. In some pedons the lower B subhorizons have hue ranging to 5YR. The B horizon is silt loam or loam.

The C horizon is commonly variegated and has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 6. It is silt loam or loam.

HtB—Highfield gravelly silt loam, 3 to 8 percent slopes, very stony

Map Unit Setting

Landscape: Mountains

Component Description

Highfield and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Gravelly silt loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of more than 60 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from greenstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Catoctin and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Rohrersville and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HtC—Highfield gravelly silt loam, 8 to 15 percent slopes, very stony

Map Unit Setting

Landscape: Mountains

Component Description

Highfield and similar soils

Composition: 80 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly silt loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of more than 60 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from greenstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Catoctin and similar soils

Composition: 15 percent
Landform: Summits and backslopes

Mt. Zion and similar soils

Composition: 5 percent
Landform: Concave footslopes, toeslopes, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HtD—Highfield gravelly silt loam, 15 to 25 percent slopes, very stony

Map Unit Setting

Landscape: Mountains

Component Description

Highfield and similar soils

Composition: 80 percent
Landform: Summits and backslopes
Slope: 15 to 25 percent
Texture of the surface layer: Gravelly silt loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of more than 60 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from greenstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Catoctin and similar soils

Composition: 15 percent
Landform: Summits and backslopes

Mt. Zion and similar soils

Composition: 5 percent
Landform: Concave footslopes, toeslopes, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Klinesville Series

Klinesville series consists of shallow, well drained soils. Permeability is moderately rapid. These soils formed in residuum derived from acid, red, fine grained sandstone and shale. They are on side slopes of highly dissected low ridges in the western part of Washington County. Slopes range from 3 to 65 percent.

Klinesville soils are similar to Weikert soils and are mapped adjacent to Berks, Brinkerton, Buchanan, Calvin, Clearbrook, Monongahela, and Sideling soils.

Weikert soils formed in gray brown shale and have a yellower solum and contain more silt than Klinesville soils. Calvin and Berks soils are on summits of low ridges and are moderately deep to bedrock. Buchanan and Sideling soils formed in colluvium derived from sandstone, and are very deep, moderately well drained, and slowly permeable. Monogahela soils formed in old alluvium on terraces, and are very deep, moderately well drained, and slowly permeable. Brinkerton and Clearbrook soils are in concave swales on uplands, have a water table within 20 inches of the surface, and are slowly permeable.

Typical pedon of Klinesville channery loam, in an area of Klinesville-Calvin channery loams, 25 to 65 percent slopes, in an east-facing, convex oak-hickory forest, about 1,500 feet north of intersection of Catholic Church Road and Lanes Run Road, east 150 feet of Catholic Church Road; near Forsythe; lat. 39 degrees 40 minutes 51 seconds N. and long. 77 degrees 59 minutes 16 seconds W.

A—0 to 1.5 inches; dark reddish brown (5YR 3/2) channery loam; weak fine granular structure; very friable; many fine and common medium and coarse roots; 20 percent angular sandstone and shale channers and 10 percent subrounded sandstone and shale gravel; very strongly acid; abrupt wavy boundary.

E—1.5 to 2.5 inches; reddish gray (5YR 5/2) very channery loam; weak very fine and fine granular structure; very friable; many very fine and fine and common medium and coarse roots; 20 percent channers and 15 percent subrounded sandstone and shale gravel; very strongly acid; abrupt broken boundary.

Bw—2.5 to 11 inches; reddish brown (5YR 4/4) very channery loam; weak fine subangular blocky structure; very friable; many very fine and fine and common medium roots; 30 percent angular sandstone and shale channers and 15 percent subrounded sandstone and shale gravel; strongly acid; clear wavy boundary.

C—11 to 16 inches; reddish brown (5YR 4/4) extremely channery loam; massive; very friable; many fine and common medium roots in cracks; 50 percent angular sandstone and shale channers and 20 percent subrounded sandstone and shale gravel; strongly acid; abrupt irregular boundary.

R—16 inches; reddish brown (5YR 4/3) fine grained sandstone and shale; strongly cemented.

The solum ranges from 10 to 20 inches in thickness. Bedrock ranges from 15 to 20 inches. Rock fragments range from 20 to 45 percent in the surface layer and from 35 to 85 percent in the solum and the substratum. Bedrock is acid, red, fine grained sandstone or shale that is highly fractured.

The A horizon has hue of 10R to 5YR, value 2 to 4, and chroma of 2 to 4. It is silt loam or loam.

The E horizon has hue of 2.5YR to 7.5YR, value 4 to 6, and chroma 2 to 4. It is silt loam or loam.

The Bw horizon has hue of 10R to 5YR, value 3 to 5, and chroma of 3 to 6. It is silt loam or loam.

The C horizon has hue of 10R to 5YR, value 3 or 4, and chroma of 3 to 6. It is silt loam or loam.

KcB—Klinesville-Calvin channery loams, 3 to 8 percent slopes

Map Unit Setting

Landscape: Mountains

Component Description

Klinesville and similar soils

Composition: 45 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 1.1 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Calvin and similar soils

Composition: 40 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.6 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Brinkerton and similar soils

Composition: 5 percent
Landform: Drainageways

Clearbrook and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Weikert and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

KcC—Klinesville-Calvin channery silt loams, 8 to 15 percent slopes

Map Unit Setting

Landscape: Mountains

Component Description

Klinesville and similar soils

Composition: 45 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more

Available water capacity: Average of 1.1 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Calvin and similar soils

Composition: 40 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.6 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Brinkerton and similar soils

Composition: 5 percent
Landform: Drainageways

Clearbrook and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Weikert and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

KcD—Klinesville-Calvin channery loams, 15 to 25 percent slopes

Map Unit Setting

Landscape: Mountains

Component Description

Klinesville and similar soils

Composition: 55 percent
Landform: Summits and backslopes
Slope: 15 to 25 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 1.1 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Calvin and similar soils

Composition: 30 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.6 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Clearbrook and similar soils

Composition: 10 percent
Landform: Swales, depressions, and drainageways

Weikert and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

KcF—Klinesville-Calvin channery loams, 25 to 65 percent slopes

Map Unit Setting

Landscape: Mountains
Note: About 5 percent of the map unit is very shallow.

Component Description

Klinesville and similar soils

Composition: 55 percent
Landform: Ridges
Slope: 25 to 65 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 1.1 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Calvin and similar soils

Composition: 30 percent
Landform: Ridges
Slope: 25 to 65 percent
Texture of the surface layer: Channery loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.6 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Clearbrook and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Weikert and similar soils

Composition: 5 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Lantz Series

The Lantz series consists of very deep, very poorly drained soils. Permeability is slow throughout. These soils are in draws on uplands and in swales, depressions, and drainageways along foot slopes of South Mountain and Elk Ridge in the eastern part of Washington County. Slopes range from 0 to 8 percent.

Lantz soils are similar to Rohrersville soils and commonly are mapped adjacent to Catoctin, Foxville, Highfield, Mt. Zion, Myersville, Ravenrock, Thurmont, and Weverton soils. Rohrersville soils are in landscape positions similar to those of Lantz soils, but have a seasonal high water table between depths of 10 and 20 inches. Catoctin soils have bedrock within a depth of 40 inches. Highfield, Mt. Zion, Myersville, Ravenrock, Thurmont, Trego, and Weverton soils are in higher landscape positions and are better drained than Lantz soils. Foxville soils have more rock fragments in the solum than Lantz soils and are near perennial streams.

Typical location on Lantz silt loam, in an area of Lantz-Rohrersville silt loams, 0 to 8 percent slopes, extremely stony, on abandoned cropland, 200 feet north of Mill Brook Road; 0.5 mile west of Rohrersville; in the Washington County wetland reserve park, near Rohrersville; lat. 39 degrees 26 minutes 18 seconds N. and long. 77 degrees 40 minutes 42 seconds W.

Ap—0 to 9 inches; very dark grayish brown (2.5Y 3/2) silt loam; strong fine and medium granular structure; very friable; many fine and medium roots; few medium tubular pores; common fine strong brown (7.5YR 5/6) oxidized rhizospheres and iron concretions; moderately acid; abrupt smooth boundary.

Eg—9 to 14 inches; light olive gray (5Y 6/2) silt loam; moderate medium angular blocky structure; friable; common fine and medium roots; common fine and medium tubular pores; common fine prominent strong brown (7.5YR 5/6) iron concretions; many prominent very dark grayish brown (2.5Y 3/2) organic films on faces of peds; moderately acid; clear wavy boundary.

Btg1—14 to 33 inches; dark grayish brown (2.5Y 4/2) silty clay loam; firm; weak coarse prismatic structure parting to strong medium angular blocky; firm; common fine and medium roots; few medium and coarse pores; few medium prominent yellowish red (5YR 5/6) iron masses; moderately acid; gradual wavy boundary.

Btg2—33 to 47 inches; grayish brown (2.5Y 5/2) clay loam; weak coarse prismatic structure parting to moderate medium angular blocky; firm; few fine roots; few fine tubular pores; few fine and medium prominent yellowish red (5YR 5/6) iron masses; 5 percent quartz rock fragments; moderately acid; clear wavy boundary.

BC—47 to 72 inches; light gray (5Y 7/2) gravelly loam; weak medium subangular blocky structure; few fine prominent strong brown (7.5YR 5/6) iron stains; very friable; 20 percent quartz rock fragments; slightly acid.

The solum ranges from 30 to 80 inches in thickness. Bedrock is at a depth of more than 60 inches. Coarse fragments range from 0 to 20 percent in the solum and from 10 to 30 percent in the substratum. They generally are metabasalt, metaandesite, sandstone, and quartz. Surface stones range from 0 to 20 percent in some pedons. In unlimed areas reaction ranges from neutral to moderately acid.

The A horizon has hue of 2.5Y or 5Y, value of 2 or 3, and chroma of 0 to 3. It has accumulations of iron. It is silt loam or loam.

The E horizon has hue of 2.5Y of 5Y, value of 4 to 6, and chroma of 0 to 2. It has accumulations of iron. It is silt loam or loam.

The B horizon has hue of 2.5Y of 5Y, value of 4 to 6, and chroma 0 to 2. It has accumulations of iron. It is silt loam, loam, silty clay loam, clay loam, or silty clay.

The C horizon is commonly variegated and has hue of 7.5YR to 5Y, value of 4 to 6, and chroma 0 to 4. It is loam, silt loam, silty clay loam, or sandy loam.

LaB—Lantz-Rohrersville silt loams, 0 to 8 percent slopes, extremely stony

Map Unit Setting

Landscape: Valleys

Component Description

Lantz and similar soils

Composition: 50 percent
Landform: Depressions
Slope: 0 to 8 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 80 inches
Drainage class: Very poorly drained
Parent material: Loamy colluvium and alluvium both derived from greenstone
Flooding: Rare
Water table: 0.0 to 0.5 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rohrersville and similar soils

Composition: 40 percent
Landform: Swales, depressions, and drainageways
Slope: 0 to 8 percent
Texture of the surface layer: Extremely stony silt loam
Depth to a restrictive feature: Fragic properties at a depth of 30 to 40 inches
Drainage class: Somewhat poorly drained
Parent material: Loamy colluvium or alluvium derived from greenstone
Flooding: None
Water table: 1.0 to 1.5 feet
Available water capacity: Average of 9.2 inches
Note: In some profiles the fragipan is weakly expressed. In some pedons a gravelly substratum is common below a depth of 40 inches.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Highfield and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Ravenrock and similar soils

Composition: 5 percent
Landform: Backslopes and footslopes on mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Lappans Series

The Lappans series consists of very deep, well drained soils. Permeability is rapid. These soils formed in alluvial and lacustrine, calcareous marl sediments. They are on active flood plains in the central limestone valley. Slopes range from 0 to 3 percent.

Lappans soils are similar to Fairplay soils and are commonly mapped adjacent to Combs, Duffield, Funkstown, Hagerstown, Lindside, Melvin, Ryder, Opequon, and Swanpond soils. Fairplay soils are very poorly drained and slowly permeable. They are on lower flood plains. Combs, Lindside, and Melvin soils formed in alluvium without marl sediments. Duffield, Funkstown, Hagerstown, Ryder, Opequon, and Swanpond soils formed in residuum derived from limestone. They are on uplands adjacent to Lappans soils.

Typical pedon of Lappans (marl) loam, in a level pasture adjacent to Marsh Run, 1,300 feet east of intersection of Bakersville Road and Spreacher Road, 2,500 feet north of Bakersville Road; near Grims; lat. 39 degrees 31 minutes 10 seconds N. and long. 77 degrees 46 minutes 40 seconds W.

Ap—0 to 7 inches; dark brown (10YR 3/3) marly loam; moderate medium and fine granular structure; friable; many fine and common medium roots; 3 percent gastropod shells; strongly alkaline (80 percent $CaCO_3$); abrupt smooth boundary.

BA—7 to 13 inches; light olive brown (2.5Y 5/3) marly sandy loam; weak medium subangular blocky and moderate medium granular structure; very friable; many fine and common medium roots; common fine tubular and vesicular pores; 4 percent gastropod shells; strongly alkaline (95 percent $CaCO_3$); clear smooth boundary.

A—13 to 20 inches; dark grayish brown (2.5Y 4/2) marly sandy loam; moderate or strong medium granular structure; very friable; common fine tubular and vesicular pores; 2 percent gastropod shells; strongly alkaline (95 percent $CaCO_3$); clear wavy boundary.

Bk1—20 to 26 inches; light yellowish brown (2.5Y 6/3) marly sandy loam; weak medium subangular blocky structure parting to weak medium granular; very friable; common fine tubular and vesicular pores; few medium tubular pores; 3 percent gastropod shells; strongly alkaline (95 percent $CaCO_3$); clear wavy boundary.

Bk2—26 to 42 inches; gray (5Y 6/1) marly loam; common fine distinct very pale brown (10YR 7/4) mottles; moderate coarse subangular blocky structure; friable; many fine and medium tubular and vesicular pores and few coarse vesicular pores; common fine distinct white (10YR 8/2) iron depletions; 2 percent gastropod shells; strongly alkaline (95 percent $CaCO_3$); clear smooth boundary.

Bk3—42 to 47 inches; very pale brown (10YR 8/2) marly clay loam; moderate coarse subangular blocky structure; friable; many fine and common medium tubular and vesicular pores and few coarse vesicular pores; common fine distinct gray (5Y 6/1) iron depletions; few fine faint pale brown (10YR 6/3) iron accumulations; 2 percent gastropod shells; strongly alkaline (95 percent $CaCO_3$); clear smooth boundary.

Ab1—47 to 54 inches; light brownish gray (10YR 6/2) marly clay loam; few fine faint light yellowish brown (2.5Y 6/3) mottles; weak medium subangular blocky structure parting to weak fine granular; many fine and common medium tubular and vesicular pores and few coarse vesicular pores; 3 percent gastropod shells; strongly alkaline (95 percent $CaCO_3$); gradual smooth boundary.

Bkb1—54 to 64 inches; light gray (10YR 7/2) marly clay loam; common fine faint very pale brown (10YR 7/4) mottles; moderate medium subangular blocky structure; many fine and medium tubular and vesicular pores, common coarse tubular pores, and few coarse vesicular pores; 3 percent gastropod shells; strongly alkaline (95 percent $CaCO_3$); clear smooth boundary.

Bkb2—64 to 71 inches; light gray (2.5Y 7/2) marly sandy loam; common medium distinct very pale brown (10YR 7/4) mottles; weak coarse subangular blocky structure; friable; many large secondary carbonate coatings on root channels; many fine and medium tubular and vesicular pores, many coarse tubular pores, and few coarse vesicular pores; 3 percent gastropod shells; strongly alkaline (95 percent $CaCO_3$); clear smooth boundary.

Akb2—71 to 78 inches; gray (10YR 5/1) marly clay loam; moderate fine subangular blocky structure; friable; common large secondary pendants and coatings on root channels; many fine and medium tubular and vesicular pores, many coarse tubular pores, and few coarse vesicular pores; few fine distinct dark yellowish brown (10YR 4/6) iron accumulations; 3 percent gastropod shells; strongly alkaline (95 percent $CaCO_3$); gradual smooth boundary.

Bkb3—78 to 85 inches; light brownish gray (2.5Y 6/2) marly clay loam; common fine faint light yellowish brown (2.5Y 6/4) mottles; weak medium subangular blocky structure; friable; many fine and medium and few coarse tubular and vesicular pores; many medium distinct white (10YR 8/2) secondary carbonate films near mottles and lining pores; 5 percent gastropod shells; strongly alkaline (95 percent $CaCO_3$); clear smooth boundary.

Ck1—85 to 115 inches; light gray (2.5Y 7/2) marly loam; 3 percent gastropod shells; very strongly alkaline (100 percent $CaCO_3$).

Depth to marl ranges from 3 to more than 20 feet. Depth to the Ab horizon ranges from 20 to 72 inches. Depth to bedrock is more than 40 inches. Depth to contrasting material is more than 40 inches.

The Ap horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 0 to 3. It is the marly analog of silt loam, loam, or sandy loam. Reaction is slightly alkaline or moderately alkaline.

The Ab horizon has hue of 10YR or 2.5Y, value of 2 to 6, and chroma of 0 to 3. It is the marly analog of silt loam, loam, or sandy loam. Reaction is strongly acid to very strongly alkaline.

The BA horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 4. It is the marly analog of loam, sandy loam, or silt loam. Reaction is moderately alkaline or strongly alkaline.

The Bk horizon has hue of 10YR to 5Y, value of 4 to 8, and chroma of 1 to 4. It is the marly analog of clay, loam, clay loam, or sandy loam. Rock fragments that consist of gastropod shells range from 2 to 10 percent. Reaction is strongly alkaline or very strongly alkaline.

The 2Bt horizon, where it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is the marly analog of silty clay loam, clay loam, or clay. Rock fragments range from 5 to 15 percent. Reaction is neutral or slightly alkaline.

The C horizon has hue of 10YR to 5Y, value of 4 to 8, and chroma of 1 to 4. It is the marly analog of loam, sandy loam, or sandy clay loam. Rock fragments that consist of gastropod shells range from 2 to 10 percent. Reaction is strongly alkaline or very strongly alkaline.

The 2C horizon, where it occurs, has hue of 7.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is the marly analog of silty clay loam, clay loam, or clay. Rock fragments range from 5 to 10 percent. Reaction is neutral or slightly alkaline.

Lb—Lappans (marl) loam

Map Unit Setting

Landscape: River valleys
Note: About 5 percent of the map unit has a clay layer within a depth of 50 inches.

Component Description

Lappans and similar soils

Composition: 85 percent
Landform: Flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Marly loam
Drainage class: Well drained
Parent material: Marl
Flooding: Occasional
Water table: 3.0 to 6.0 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Fairplay and similar soils

Composition: 5 percent
Landform: Flood plains

Melvin and similar soils

Composition: 5 percent
Landform: Flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Lindside Series

The Lindside series consists of very deep, moderately well drained soils. Permeability is moderate. These soils formed in alluvium derived from limestone on uplands. They are on active flood plains within the central limestone valley of Washington County. Slopes range from 0 to 3 percent.

Lindside soils are similar to Combs soils and commonly are mapped adjacent to Bigpool, Deposit, Fairplay, Lappans, and Melvin soils. Combs soils have a thick, dark brown surface layer and are well drained. Fairplay and Lappans soils formed in alluvium derived from marl and have a lighter colored solum than Lindside soils. Deposit soils have more sand and gravel throughout the solum than Lindside soils. Melvin soils formed in silty alluvium and are poorly drained. Bigpool soils are on higher flood plains along the Potomac River and are subject to rare flooding.

Typical pedon of Lindside silt loam, on level cropland adjacent to Antietam Creek, 1,500 feet south of intersection of MD-60 and MD-62, 1,500 feet west of

MD-62, near Leitersburg; lat. 39 degrees 41 minutes 10 seconds N. and long. 77 degrees 38 minutes 13 seconds W.

Ap1—0 to 8 inches; brown (10YR 4/3) silt loam; strong fine granular structure; very friable; many fine and common medium roots; common fine tubular pores and few medium tubular and vesicular pores; slightly alkaline; abrupt smooth boundary.

Ap2—8 to 13 inches; brown (10YR 4/3) silt loam; moderate medium subangular blocky structure parting to strong fine granular; very friable; many fine and few medium roots; common fine and medium and few coarse tubular pores; common coarse faint dark brown (10YR 3/3) organic films lining pores; slightly alkaline; abrupt smooth boundary.

Bw1—13 to 28 inches; dark yellowish brown (10YR 4/4) silt loam; weak coarse prismatic structure parting to moderate coarse and medium subangular blocky; friable; many fine roots; many fine and common medium tubular and vesicular pores, few coarse tubular pores, and common coarse vesicular pores; common coarse faint dark brown (10YR 3/3) organic films lining pores; slightly alkaline; gradual wavy boundary.

Bw2—28 to 34 inches; brown (10YR 4/3) silt loam; moderate coarse prismatic structure parting to moderate fine subangular blocky; friable; common fine roots; many fine and common medium tubular and vesicular pores and few coarse tubular pores; many medium distinct very dark gray (10YR 3/1) organic films; slightly alkaline; clear wavy boundary.

Bg1—34 to 40 inches; very dark gray (10YR 3/1) silt loam; moderate coarse prismatic structure parting to moderate fine subangular blocky; very friable; common fine roots; common fine and medium tubular and vesicular pores and common coarse tubular pores; many fine distinct dark gray (10YR 4/1) iron depletions; slightly alkaline; clear wavy boundary.

Bg2—40 to 46 inches; dark gray (10YR 4/1) silt loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; common fine roots; common fine tubular and vesicular pores and few medium and coarse tubular pores; many fine prominent strong brown (7.5YR 4/6) iron accumulations; slightly alkaline; gradual wavy boundary.

Bg3—46 to 66 inches; variegated dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) silt loam; moderate coarse prismatic structure parting to strong medium subangular blocky; friable; common fine roots; common fine tubular and vesicular pores and few medium and coarse tubular pores; common fine distinct strong brown (7.5YR 5/6) iron accumulations; few medium distinct very pale brown (10YR 8/2) iron depletions; common fine distinct iron-manganese stains; slightly alkaline; gradual wavy boundary.

BCg—66 to 73 inches; grayish brown (10YR 5/2) gravelly sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few fine tubular and vesicular pores; many medium distinct dark brown (7.5YR 4/4) iron accumulations; 17 percent gravel; slightly alkaline.

The solum ranges from 40 to 80 inches in thickness. Reaction ranges from moderately acid to slightly alkaline. Rock fragments range from 0 to 25 percent within a depth of 40 inches and from 0 to 30 percent below a depth of 40 inches. In some pedons the gravel content is higher above a depth of 40 inches.

The Ap horizon has hue of 7.5YR to 10YR, value of 3 to 5, and chroma of 2 or 3. It is silt loam, loam, and silty clay loam.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is silty clay loam, silt loam, sandy clay loam, or loam.

The Bg and BCg horizons have hue of 7.5YR to 10YR, value of 4 or 5, and chroma of 0 to 2. It is silty clay loam, silt loam, sandy clay loam, or loam.

The C horizon, where it occurs, has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 4. It is silt loam, loam, fine sandy loam, or clay loam.

Ln—Lindside silt loam

Map Unit Setting

Landscape: River valleys
Note: In some pedons the texture of the surface layer is coarser than described.

Component Description

Lindside and similar soils

Composition: 85 percent
Landform: Flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Drainage class: Moderately well drained
Parent material: Loamy alluvium derived from limestone and sandstone and from shale
Flooding: Frequent
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 8.0 inches
Note: In some pedons a gravelly or very gravelly

horizon is above a depth of 30 inches.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Combs and similar soils

Composition: 5 percent
Landform: Flood plains

Fairplay and similar soils

Composition: 5 percent
Landform: Flood plains

Melvin and similar soils

Composition: 5 percent
Landform: Flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Melvin Series

The Melvin series consists of very deep, poorly drained soils. Permeability is moderate. These soils formed in recent alluvial sediments derived from soils formed in limestone on uplands. They are on active flood plains in the central limestone valley of Washington County. Slopes range from 0 to 3 percent.

Melvin soils are similar to Lindside soils and are mapped adjacent to Bigpool, Deposit, Fairplay, Combs, and Lappans soils. Lindside soils are moderately well drained. Combs soils have a thick, dark brown surface layer and are well drained. Fairplay and Lappans soils formed in alluvium derived from marl and have a lighter colored solum than Melvin soils. Deposit soils have much more sand and gravel within the solum than Melvin soils. Bigpool soils are on high flood plains along the Potomac River and are moderately well drained.

Typical pedon of Melvin silt loam, in a level hayfield adjacent to Little Beaver Creek, about 400 feet north of Benevola Church Road and 600 feet west of MD-66; near Sanmar; lat. 39 degrees 33 minutes 18 seconds N. and long. 77 degrees 39 minutes 1 seconds W.

Ap—0 to 12 inches; dark grayish brown (10YR 4/2) silt loam; weak medium subangular blocky structure parting to strong fine granular; friable; many fine roots; many medium tubular pores; common fine prominent dark brown (7.5YR 3/4) soft iron concretions; many fine and medium dark yellowish brown (10YR 4/6) soft masses of iron accumulation; 2 percent gravel; slightly alkaline; abrupt smooth boundary.

Bg1—12 to 17 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine and medium faint light yellowish brown (2.5Y 6/4) mottles; moderate medium subangular blocky structure; firm; many fine and medium roots; many fine vesicular and tubular pores and common medium and coarse tubular pores; common fine prominent dark brown (7.5YR 3/4) iron concretions; common fine yellowish brown (10YR 5/6) iron accumulations; few fine and medium distinct very dark grayish brown (10YR 3/2) organic films lining pores and on faces of peds; 2 percent gravel; slightly alkaline; clear smooth boundary.

Bg2—17 to 23 inches; 50 percent light olive gray (5Y 6/2) and 30 percent yellowish brown (10YR 5/8) silty clay loam; common fine distinct dark yellowish brown (10YR 3/4) mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm; common fine and very fine roots; many medium and common coarse tubular pores and many fine tubular and vesicular pores; common fine and medium prominent gray (N 5/0) manganese concretions; few fine and medium distinct gray (2.5Y 5/1) organic film coatings; 5 percent gravel; slightly alkaline; clear wavy boundary.

Bg3—23 to 30 inches; 40 percent yellowish brown (10YR 5/8) and 45 percent gray (5Y 6/1) silty clay loam; fine and medium distinct light yellowish brown (2.5Y 6/4) mottles; coarse prismatic structure parting to weak fine subangular blocky; firm; many fine and common medium roots in cracks; many fine tubular pores; common fine and medium prominent gray (N 5/0) manganese concretions; few fine and medium distinct dark brown (10YR 3/3) organic films lining pores and on faces of peds; 10 percent gravel; neutral; clear wavy boundary.

C1—30 to 43 inches; 30 percent grayish brown (2.5Y 5/2) and 45 percent brownish yellow (10YR 6/8) loam; common fine and medium distinct light yellowish brown (2.5Y 6/4) mottles; massive; friable; common very fine and fine roots in cracks; many medium gray (N 5/0) iron depletions; common fine and medium light olive brown (2.5Y 5/6) soft masses of iron; 10 percent gravel; neutral; clear wavy boundary.

C2—43 to 70 inches; 50 percent brownish yellow (10YR 6/8) and 30 percent grayish brown

(2.5Y 5/2) gravelly loam; common fine and medium distinct light yellowish brown (2.5Y 6/4) mottles; massive; very friable; common fine gray (N 5/0) soft manganese concretions; 25 percent rock fragments; neutral.

The solum ranges from 25 to 40 inches in thickness. Depth to bedrock is more than 60 inches. The soil ranges from moderately acid to slightly alkaline.

The A horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 to 4. It is silt loam, loam, or silty clay loam.

The Bg horizon has hue of 10YR to 5Y or is neutral, value of 4 to 7, and chroma of 2 or less. It is silt loam or silty clay loam.

The C horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 0 to 8. It is silt loam, loam, or silty clay loam. Commonly, layers of stratified sand and gravel are below a depth of 40 inches.

Me—Melvin silt loam

Map Unit Setting

Landscape: River valleys
Note: Water ponds in backwater areas and depressions.

Component Description

Melvin and similar soils

Composition: 85 percent
Landform: Flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Drainage class: Poorly drained
Parent material: Loamy alluvium derived from limestone and sandstone or from shale
Flooding: Frequent
Water table: 0.0 to 1.0 feet
Available water capacity: Average of 8.0 inches
Note: Some profiles contain small amounts of marl, or have a gravelly horizon, stratified sands, or gravel in the substratum.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Combs and similar soils

Composition: 5 percent
Landform: Flood plains

Lappans and similar soils

Composition: 5 percent
Landform: Flood plains

Lindside and similar soils

Composition: 5 percent
Landform: Flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Monongahela Series

The Monongahela series consists of very deep, moderately well drained soils. Permeability is slow. These soils formed in old alluvium derived from acid sandstone and shale. They are on terraces. Slopes range from 0 to 25 percent.

Monongahela soils are similar to Downsville and Tyler soils and are mapped adjacent to Berks, Bigpool, Brinkerton, Combs, Deposit, and Weikert soils. Downsville soils are on higher terraces, average more than 35 percent gravel throughout the solum, do not have a fragipan, and are well drained. Tyler soils are somewhat poorly drained and have less sand, more silt, and fewer rock fragments in the solum than Monongahela soils. Berks and Weikert soils formed in residuum derived from acid shale, have shale bedrock within a depth of 40 inches, and do not have a fragipan. Bigpool, Combs, and Deposit soils are on active flood plains near large streams and rivers. Brinkerton soils are on concave shale uplands and are poorly drained.

Typical pedon of Monongahela silt loam, 8 to 15 percent slopes, on convex cropland, 2,000 feet west of junction of Kemp Mills Road and the Conococheague River, north 600 feet from Kemp Mills Road; near Pinesburg; lat. 39 degrees 37 minutes 59 seconds N. and long. 77 degrees 50 minutes 35 seconds W.

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium platy structure; friable; many fine and few medium roots; few very fine vesicular and common fine tubular pores; 5 percent gravel; neutral; abrupt smooth boundary.

Bt1—8 to 17 inches; yellowish brown (10YR 5/6) loam; strong medium platy structure; friable; common fine and few medium roots; few fine tubular and common fine vesicular pores; few faint clay films on faces of peds; 5 percent gravel; neutral; clear wavy boundary.

Bt2—17 to 27 inches; reddish yellow (7.5YR 6/6) loam; moderate medium platy structure; friable; few fine roots; few fine and common medium vesicular and tubular pores; common distinct clay films on faces of peds and lining pores; 5 percent gravel; slightly acid; clear wavy boundary.

Btx1—27 to 44 inches; strong brown (7.5YR 5/8) loam; moderate very coarse prismatic structure parting to moderate medium platy; firm; few fine distinct light brownish gray (10YR 6/2) iron depletions; common prominent clay films on faces of prisms; 5 percent gravel; moderately acid; clear wavy boundary.

Btx2—44 to 64 inches; brownish yellow (10YR 6/6) loam; moderate very coarse prismatic structure parting to strong medium platy; firm; common distinct brownish gray (10YR 6/2) iron depletions; common prominent clay films on faces of prisms; 5 percent gravel; strongly acid; clear wavy boundary.

C—64 to 82 inches; light gray (10YR 7/2) sandy loam; massive; friable; many medium distinct brownish yellow (10YR 6/6) iron accumulations; few faint discontinuous clay films lining pores; 5 percent gravel; moderately acid.

The solum ranges from 40 to 70 inches in thickness. Depth to the fragipan ranges from 18 to 30 inches. Rock fragments range from 0 to 20 percent above the fragipan, from 0 to 10 percent in the fragipan, and from 10 to 40 percent in the C horizon. Reaction is strongly acid or very strongly acid throughout.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam, loam, or fine sandy loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is silt loam, loam, silty clay loam, clay loam, or sandy clay loam.

The Btx horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 8. It is silt loam, loam, sandy clay loam, clay loam, or fine sandy loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 8. It is sandy loam, loam, silty loam, silty clay loam, and clay loam.

MgA—Monongahela silt loam, 0 to 3 percent slopes

Map Unit Setting

Landscape: River valleys

Component Description

Monongahela and similar soils

Composition: 85 percent
Landform: Stream terraces
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: A fragipan is at a depth of 25 to 50 inches
Drainage class: Moderately well drained
Parent material: Loamy, old alluvium derived from sandstone and shale
Flooding: None
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 6.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Tyler and similar soils

Composition: 10 percent
Landform: Stream terraces

Unnamed poorly drained soils

Composition: 3 percent
Landform: Depressions

Downsville and similar soils

Composition: 2 percent
Landform: High stream terraces

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MgB—Monongahela silt loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: River valleys

Component Description

Monongahela and similar soils

Composition: 85 percent
Landform: Stream terraces
Slope: 3 to 8 percent
Texture of the surface layer: Silt loam

Depth to a restrictive feature: A fragipan is at a depth of 25 to 50 inches
Drainage class: Moderately well drained
Parent material: Loamy, old alluvium derived from sandstone and shale
Flooding: None
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 6.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Downsville and similar soils

Composition: 5 percent
Landform: High stream terraces

Tyler and similar soils

Composition: 5 percent
Landform: Stream terraces

Unnamed poorly drained soils

Composition: 5 percent
Landform: Depressions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MgC—Monongahela silt loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: River valleys

Component Description

Monongahela and similar soils

Composition: 85 percent
Landform: Stream terraces
Slope: 8 to 15 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: A fragipan is at a depth of 25 to 50 inches
Drainage class: Moderately well drained
Parent material: Loamy, old alluvium derived from sandstone and shale
Flooding: None
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 6.2 inches
Note: Some profiles have a gravelly horizon, stratified sands, or gravel in the substratum.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Tyler and similar soils

Composition: 10 percent
Landform: Stream terraces

Downsville and similar soils

Composition: 5 percent
Landform: High stream terraces

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MgD—Monongahela silt loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: River valleys

Component Description

Monongahela and similar soils

Composition: 85 percent
Landform: Stream terraces
Slope: 15 to 25 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Fragipan is at a depth of 25 to 50 inches
Drainage class: Moderately well drained
Parent material: Loamy, old alluvium derived from sandstone and shale
Flooding: None
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 6.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Berks and similar soils

Composition: 10 percent

Landform: Summits and backslopes

Downsville and similar soils

Composition: 5 percent
Landform: High stream terraces

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MhA—Monongahela gravelly loam, 0 to 3 percent slopes

Map Unit Setting

Landscape: River valleys

Component Description

Monongahela and similar soils

Composition: 85 percent
Landform: Stream terraces
Slope: 0 to 3 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Fragipan is at a depth of 25 to 50 inches
Drainage class: Moderately well drained
Parent material: Loamy, old alluvium derived from sandstone and shale
Flooding: None
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 7.7 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Tyler and similar soils

Composition: 10 percent
Landform: Stream terraces

Unnamed poorly drained soils

Composition: 3 percent
Landform: Depressions

Downsville and similar soils

Composition: 2 percent
Landform: High stream terraces

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MhB—Monongahela gravelly loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: River valleys

Component Description

Monongahela and similar soils

Composition: 85 percent
Landform: Stream terraces
Slope: 3 to 8 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Fragipan is at a depth of 25 to 50 inches
Drainage class: Moderately well drained
Parent material: Loamy, old alluvium derived from sandstone and shale
Flooding: None
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 7.7 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Downsville and similar soils

Composition: 5 percent
Landform: High stream terraces

Tyler and similar soils

Composition: 5 percent
Landform: Stream terraces

Unnamed poorly drained soils

Composition: 5 percent
Landform: Depressions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MhC—Monongahela gravelly loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: River valleys

Component Description

Monongahela and similar soils

Composition: 85 percent
Landform: Stream terraces
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Fragipan is at a depth of 20 to 50 inches
Drainage class: Moderately well drained
Parent material: Loamy, old alluvium derived from sandstone and shale
Flooding: None
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 7.7 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Downsville and similar soils

Composition: 8 percent
Landform: High stream terraces

Berks and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Tyler and similar soils

Composition: 2 percent
Landform: Stream terraces

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Mt. Zion Series

The Mt. Zion series consists of very deep, moderately well drained soils. Permeability is moderately slow. These soils formed in residuum or soil creep derived from greenstone. They are on backslopes and footslopes of mountains in the eastern part of Washington County. Slopes range from 0 to 15 percent.

Mt. Zion soils are similar to Ravenrock soils and commonly are mapped adjacent to Catoctin, Highfield, Lantz, Myersville, and Rohrersville soils. Catoctin soils are well drained and moderately deep to bedrock. Ravenrock soils are higher on the landscape and have more rock fragments throughout than Mt. Zion soils. Myersville soils are well drained and moderately permeable. Rohrersville and Lantz soils are on lower, concave, broad flats and drainageways. They are somewhat poorly drained and very poorly drained, respectively.

Typical pedon of Mt. Zion gravelly silt loam, 3 to 8 percent slopes, in woodland, about 3,700 feet east of intersection of Mt. Zion Church Road and Catoctin park trail across from Mt. Zion Church, 30 feet southeast of trail; lat. 39 degrees 40 minutes 29 seconds N. and long. 77 degrees 29 minutes 9 seconds W.

Oi—0 to 0.5 inch; partly decomposed leaf and twig litter.

Ap1—0.5 to 2 inches; very dark grayish brown (10YR 3/2) gravelly silt loam; weak thin platy structure parting to moderate fine granular; very friable; many fine and common medium and few coarse roots; 15 percent quartz and greenstone gravel; moderately acid; abrupt smooth boundary.

Ap2—2 to 6 inches; dark brown (10YR 3/3) silt loam; moderate medium subangular blocky structure parting to moderate fine granular; very friable; many fine and common medium and coarse roots; 10 percent quartz and greenstone gravel; strongly acid; abrupt smooth boundary.

BE—6 to 12 inches; dark yellowish brown (10YR 4/4) gravelly silt loam; weak medium subangular blocky structure; friable; many fine and common medium roots; common fine and few medium vesicular and tubular pores; few fine faint dark brown (10YR 3/3) organic films in root channels and pores; 15 percent gravel; strongly acid; clear wavy boundary.

Bt1—12 to 19 inches; dark yellowish brown (10YR 4/6) loam; moderate medium subangular blocky structure; friable; common fine and medium roots; many fine vesicular and tubular pores and few medium tubular pores; common medium faint yellowish brown (10YR 5/6) silt coatings on faces of peds; 10 percent gravel and 3 percent cobbles; strongly acid; clear wavy boundary.

Bt2—19 to 31 inches; yellowish red (5YR 5/6) gravelly loam; common fine and medium prominent reddish brown (2.5YR 5/4) mottles; weak coarse subangular blocky structure parting to moderate medium subangular blocky; friable; common fine roots in cracks between peds; common fine vesicular and tubular pores and common medium vesicular pores; many fine distinct strong brown (7.5R 4/6) silt coatings on faces of peds; 2 percent cobbles and 20 percent gravel; moderately acid; clear wavy boundary.

Bt3—31 to 48 inches; yellowish red (5YR 4/6) gravelly silt loam; weak coarse prismatic structure parting to weak thin platy; firm; common fine roots in cracks and along faces of peds; common medium vesicular and tubular pores; few medium prominent light yellowish brown (2.5Y 6/4) iron depletions; many fine and medium distinct black (5YR 2/1) manganese stains in pores and on faces of peds; common fine distinct strong brown (7.5YR 4/6) silt coatings on faces of peds and lining pores; 3 percent cobbles, 20 percent gravel, and 1 percent stones; slightly acid; clear wavy boundary.

BC—48 to 69 inches; strong brown (7.5YR 4/6) very gravelly loam; common fine and medium prominent light yellowish brown (2.5Y 6/4) lithochromic mottles; weak coarse subangular blocky structure; firm; few fine roots in cracks; many fine tubular and few fine vesicular pores; common medium light reddish brown (5YR 6/4) iron depletions; many fine and medium distinct black (5YR 2/1) manganese stains on faces of peds and in pores; 5 percent cobbles and 20 percent channers; 5 percent gravel, 10 percent flagstones, and 5 percent cobbles; slightly acid; abrupt wavy boundary.

R—69 inches; unweathered greenstone.

The solum ranges from 30 to 70 inches in thickness. Bedrock is at a depth of more than 5 feet. Rock fragments range from 0 to 20 percent in the surface layer and in the upper part of the subsoil and from 15 to 45 percent in the lower part of the subsoil and in the substratum. Surface stones range from 0 to 10 percent. Reaction ranges from strongly acid to slightly acid.

The A horizon has a hue of 10YR to 2.5Y, value of 2 to 5, and chroma of 1 to 4. It is silt loam or loam.

The BE horizon has a hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma 4 to 6. It is loam or silt loam.

The Bt horizon has a hue of 5YR to 10YR, value 4 or 6, and chroma 4 to 8. It is loam, silt loam, clay loam, or silty clay loam.

The BC horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam, silt loam, clay loam, or silty clay loam.

The C horizon, where it occurs, is variegated and has hue of 5YR to 10YR, value 5 or 6, and chroma 4 to 8. It is silt loam, loam, clay loam, or silty clay loam.

MkB—Mt. Zion gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Mt. Zion and similar soils

Composition: 85 percent
Landform: Saddles and swales
Slope: 3 to 8 percent
Texture of the surface layer: Gravelly silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 80 inches
Drainage class: Moderately well drained
Parent material: Loamy colluvium and residuum both derived from greenstone
Flooding: None
Water table: 3.0 to 4.0 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Myersville and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Lantz and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MkC—Mt. Zion gravelly silt loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Mt. Zion and similar soils

Composition: 85 percent
Landform: Concave footslopes, toeslopes, and drainageways
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 80 inches
Drainage class: Moderately well drained

Parent material: Loamy residuum and colluvium derived from greenstone
Flooding: None
Water table: 3.0 to 4.0 feet
Available water capacity: Average of 8.0 inches
Note: In some pedons the profile is coarser than described and bedrock is at a depth of less than 60 inches.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Catoctin and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Lantz and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Myersville and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MmA—Mt. Zion-Rohrersville silt loams, 0 to 3 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Mt. Zion and similar soils

Composition: 45 percent
Landform: Saddles and swales
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 80 inches
Drainage class: Moderately well drained
Parent material: Loamy residuum and colluvium derived from greenstone
Flooding: None
Water table: 3.0 to 4.0 feet
Available water capacity: Average of 8.0 inches

Rohrersville and similar soils

Composition: 45 percent
Landform: Swales, depressions, and drainageways
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Fragic properties at a depth of 30 to 40 inches
Drainage class: Somewhat poorly drained
Parent material: Loamy colluvium and alluvium derived from greenstone
Flooding: None
Water table: 1.0 to 1.5 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Lantz and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Myersville and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Murrill Series

The Murrill series consists of very deep, well drained soils. Permeability is moderate. These soils formed in acid colluvium derived from sandstone over residuum derived from limestone. Murrill soils are on colluvial fans that extend into the central limestone valley of Washington County. Slopes range from 3 to 25 percent.

Murrill soils are similar to Braddock soils and commonly are mapped adjacent to Bagtown, Buchanan, Duffield, Dryrun, Funkstown, Hagerstown, Opequon, Ryder, Sideling, Swanpond, Thurmont, and Trego soils. Braddock soils are redder than Murrill soils and have a clayey solum. Bagtown, Buchanan, Dryrun, Sideling, Thurmont, and Trego soils are slowly permeable and have a seasonal high water table. Duffield, Hagerstown, Opequon, and Ryder soils are on convex uplands and formed in residuum derived from limestone. Swanpond soils are in concave flats on uplands, have a clayey solum, are slowly permeable, and are moderately well drained. Funkstown soils are in concave drainageways on uplands, are subject to flooding, and are moderately well drained.

Typical pedon of Murrill gravelly loam, 8 to 15 percent slopes, on south-facing, convex cropland, 1,800 feet north of intersection of Broadfording Road and Draper Road, 1,600 feet west of Draper Road; near Clear Springs; lat. 39 degrees 39 minutes 40 s; long. 77 degrees 56 minutes 21 s.

Ap—0 to 6 inches; brown (7.5YR 4/4) gravelly loam; weak fine granular structure; very friable; many fine roots; 30 percent sandstone gravel; neutral; abrupt smooth boundary.

Bt1—6 to 19 inches; yellowish red (5YR 5/6) gravelly clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; many fine roots; many fine vesicular pores and few medium and coarse tubular pores; common faint discontinuous clay films lining pores and on faces of peds; 20 percent sandstone gravel; neutral; gradual wavy boundary.

Bt2—19 to 39 inches; yellowish red (5YR 5/6) gravelly clay loam; many fine prominent brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; firm; few fine roots; common fine and medium vesicular and tubular pores; many distinct discontinuous clay films lining pores and on faces of peds; 30 percent sandstone gravel; moderately acid; clear wavy boundary.

Bt3—39 to 57 inches; yellowish red (5YR 5/6) very gravelly clay loam; many coarse prominent olive yellow (2.5Y 6/6) mottles; weak medium subangular blocky structure; friable; few fine roots; few fine vesicular and tubular pores; many distinct discontinuous clay films lining pores and on faces of peds; common medium prominent black (N/0) manganese stains; 35 percent sandstone gravel; moderately acid; clear wavy boundary.

2BC—57 to 72 inches; brownish yellow (10YR 6/8) silty clay loam; many coarse prominent yellowish red (5YR 5/6) mottles; few fine prominent very pale brown (10YR 8/2) lithochromic mottles; weak coarse platy structure; friable; few fine vesicular pores; few distinct discontinuous clay films on faces of peds; strongly acid.

The solum ranges from 60 to 80 inches or more in thickness. Depth to limestone bedrock is more than 6 feet. Rock fragments range from 10 to 30 percent in the solum and from 0 to 40 percent in the substratum. In limed areas reaction is neutral or slightly acid in the surface layer and strongly acid to slightly acid in the solum and the substratum.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 3 to 5. It is silt loam, loam, or sandy loam.

The Bt horizon has hue of 5YR to 10YR, value 4 to 6, and chroma 4 to 6. It is loam, silt loam, clay loam, silty clay loam, or sandy clay loam.

The 2BC horizon has hue of 2.5YR to 10YR, value 4 to 8, and chroma 4 to 8. It is commonly variegated. It is loam, silty clay loam, clay loam, or silty clay.

MoB—Murrill silt loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Murrill and similar soils

Composition: 85 percent
Landform: Undulating, old colluvial fans
Slope: 3 to 8 percent
Texture of the surface layer: Silt loam
Drainage class: Well drained
Parent material: Loamy, old colluvium
Flooding: None
Water table: 4.0 to 6.0 feet
Available water capacity: Average of 7.2 inches
Note: On some footslopes the profile is seasonally wet below a depth of 60 inches. In some pedons the profile has clay layers below a depth of 40 inches and gravelly layers above that depth. Depressions where water is ponded and both active and inactive sinkholes are common in this unit.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Dryrun and similar soils

Composition: 9 percent
Landform: Alluvial fans

Ryder and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Unnamed Soils

Composition: 1 percent
Landform: Depressions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MoC—Murrill silt loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: On eroded summits and shoulders the surface layer has more clay than described.

Component Description

Murrill and similar soils

Composition: 85 percent
Landform: Undulating, old colluvial fans
Slope: 8 to 15 percent
Texture of the surface layer: Silt loam
Drainage class: Well drained
Parent material: Loamy, old colluvium
Flooding: None
Water table: 4.0 to 6.0 feet
Available water capacity: Average of 7.4 inches
Note: On some footslopes the profile is seasonally wet below a depth of 60 inches. In some pedons the profile has clay layers below a depth of 40 inches and gravelly layers above that depth. Depressions where water is ponded and both active and inactive sinkholes are common in this unit.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Dryrun and similar soils

Composition: 10 percent
Landform: Alluvial fans

Ryder and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MsB—Murrill gravelly loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: In some areas cobbles cover 5 percent of the surface. On eroded summits and shoulders, the surface layer has more clay than described.

Component Description

Murrill and similar soils

Composition: 85 percent
Landform: Undulating, old colluvial fans
Slope: 3 to 8 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy, old colluvium; limestone
Flooding: None
Water table: Available water capacity: Average of 7.2 inches
Note: On some footslopes the profile is seasonally wet below a depth of 60 inches. In some pedons the profile has gravelly layers above a depth of 40 inches and clay layers below that depth. Depressions where water ponds and both active and inactive sinkholes are common.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Dryrun and similar soils

Composition: 9 percent
Landform: Alluvial fans

Ryder and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Unnamed soils

Composition: 1 percent
Landform: Depressions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MsC—Murrill gravelly loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: In some areas cobbles cover 5 percent of the surface. On eroded summits and shoulders, the surface layer has more clay than described.

Component Description

Murrill and similar soils

Composition: 85 percent
Landform: Undulating, old colluvial fans
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy, old colluvium over limestone
Flooding: None
Water table: 4.0 to 6.0 feet
Available water capacity: Average of 7.2 inches
Note: On some footslopes the profile is seasonally wet below a depth of 60 inches. In some pedons the profile has gravelly layers above a depth of 40 inches and clay layers below that depth. Depressions where water ponds and both active and inactive sinkholes are common.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Ryder and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Dryrun and similar soils

Composition: 5 percent
Landform: Alluvial fans

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MsD—Murrill gravelly loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: In some areas cobbles cover 5 percent of the surface. On eroded summits and shoulders, the surface layer has more clay than described.

Component Description

Murrill and similar soils

Composition: 85 percent
Landform: Undulating, old colluvial fans
Slope: 15 to 25 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy, old colluvium over limestone
Flooding: None
Water table: 4.0 to 6.0 feet
Available water capacity: Average of 7.1 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Ryder and similar soils

Composition: 15 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MuB—Murrill-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Murrill and similar soils

Composition: 45 percent
Landform: Undulating, old colluvial fans
Slope: 0 to 8 percent

Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy, old colluvium over limestone
Flooding: None
Water table: 4.0 to 6.0 feet
Available water capacity: Average of 7.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Urban land

Composition: 45 percent
Landform: Man-influenced
Slope: 0 to 8 percent
Texture of the surface layer: Concrete and asphalt
Depth to a restrictive feature: Concrete surface
Parent material: Man-influenced
Flooding: None

Additional Components

Dryrun and similar soils

Composition: 5 percent
Landform: Alluvial fans

Ryder and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MuD—Murrill-Urban land complex, 8 to 25 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Murrill and similar soils

Composition: 45 percent
Landform: Undulating, old colluvial fans
Slope: 8 to 25 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy, old colluvium over limestone
Flooding: None
Water table: 4 to 6 feet
Available water capacity: Average of 7.2 inches

Urban Land

Composition: 45 percent
Landform: Man influenced
Slope: 8 to 25 percent
Texture of the surface layer: Concrete and asphalt
Depth to a restrictive feature: Concrete surface
Parent material: Man influenced
Flooding: None

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Dryrun and similar soils

Composition: 5 percent
Landform: Alluvial fans

Ryder and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Myersville Series

The Myersville series consists of very deep, well drained soils. Permeability is moderate. These soils formed in material derived from greenstone. They are on uplands. Slopes range from 0 to 25 percent.

Myersville soils are similar to Highfield soils and commonly are mapped adjacent to Catoctin, Lantz, Mt. Zion, Ravenrock, and Rohrersville soils. Highfield soils are, on average, less than 18 percent clay and contain more metarhyolite and metaandisite fragments than Myersville soils. Catoctin soils are moderately deep to bedrock. They have more rock fragments throughout the solum than Myersville soils. Lantz soils are poorly drained and are in lower landscape positions.
Mt. Zion soils are very deep, moderately well drained, and slowly permeable. Rohrersville soils are in swales

on uplands and along intermittent drainageways, have weak fragic properties in some pedons, and have a seasonal high water table within a depth of 20 inches.

Typical pedon of Myersville silt loam, 3 to 8 percent slopes, about 2,300 feet southeast of Kaetzell Road and an old railroad grade, 2,500 feet west of intersection of MD-67 and Main street; in Gapland; lat. 39 degrees 23 minutes 46 seconds N. and long. 77 degrees 39 minutes 59 seconds W.

Ap1—0 to 6 inches; brown (7.5YR 4/3) silt loam; weak fine granular structure; friable; many fine roots; common medium tubular pores; 10 percent gravel; slightly acid; clear smooth boundary.

Ap2—6 to 12 inches; brown (7.5YR 4/3) silt loam; moderate fine granular structure; friable; many fine and common medium roots; common coarse and medium tubular pores, common coarse vesicular pores, and many fine tubular pores; 5 percent gravel; neutral; abrupt smooth boundary.

Bt1—12 to 20 inches; strong brown (7.5YR 4/6) loam; moderate medium subangular blocky structure; friable; common fine roots; many fine common medium and few coarse tubular pores and common fine and few medium vesicular pores; common medium distinct very dark gray (5YR 3/1) manganese stains in the lower part of the horizon; common distinct discontinuous clay skins on faces of peds and in pores; 10 percent gravel; slightly acid; clear wavy boundary.

Bt2—20 to 35 inches; strong brown (7.5YR 5/6) loam; moderate fine platy structure parting to weak coarse subangular blocky; friable; common fine roots; common fine tubular and vesicular pores and few medium tubular pores; common coarse prominent very dark gray (5YR 3/1) manganese stains; many prominent discontinuous clay films on faces of peds and in pores; 5 percent gravel; strongly acid; clear wavy boundary.

Bt3—35 to 50 inches; yellowish red (5YR 5/6) clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; few fine and common medium tubular pores; common medium prominent very dark gray (5YR 3/1) manganese stains and common coarse distinct yellowish red (5YR 4/6) clay films on faces of peds; 5 percent gravel; moderately acid; clear wavy boundary.

B/C—50 to 61 inches; dark brown (7.5YR 4/4) clay loam in the B part and light olive brown (2.5Y 5/4) loam in the C part; moderate coarse subangular blocky structure parting to weak thin platy derived from bedrock; friable; few fine roots; common fine and medium tubular pores and few fine vesicular pores; common coarse prominent very dark gray (5YR 3/1) manganese stains; few distinct discontinuous clay skins on faces of peds; 9 percent weathered coarse fragments of greenstone; strongly acid; clear irregular boundary.

C—61 to 71 inches; strong brown (7.5YR 4/6) loam; common coarse prominent light olive brown (2.5Y 5/4) mottles; few medium prominent very dark gray (5YR 3/1) manganese stains; weak coarse platy structure derived from paralithic contact; friable; few fine roots; few fine tubular pores; few distinct discontinuous clay skins; 5 percent coarse fragments of greenstone; strongly acid; clear irregular boundary.

Cr—71 to 80 inches; moderately cemented greenstone and, in the fine earth fraction, loam.

R—80 inches; rigid bedrock.

The solum ranges from 30 to 60 inches in thickness. Depth to paralithic contact ranges from 50 to 80 inches. Depth to lithic contact is more than 60 inches. Fragments of gravel range from 0 to 25 percent in the surface layer and subsoil and from 5 to 30 percent in the substratum. Reaction is slightly acid to strongly acid.

The A horizon has hue of 10YR to 7.5YR, value of 3 to 4, and chroma of 2 to 4. It is silt loam or loam.

The Bt horizon has a hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is silt loam, clay loam, or loam.

The C horizon is variegated and has colors that have hue of 5YR to 5Y, value of 4 to 6, and chroma of 4 to 8. It is silt loam, loam, or clay loam.

MvB—Myersville silt loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Valleys
Note: Spring seeps are on some footslopes.

Component Description

Myersville and similar soils

Composition: 90 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of 60 inches or more
Drainage class: Well drained

Parent material: Gravelly residuum derived from granitic gneiss or from greenstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Catoctin and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Rohrersville and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MvC—Myersville silt loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Valleys
Note: Spring seeps are on some footslopes.

Component Description

Myersville and similar soils

Composition: 90 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of 60 inches or more
Drainage class: Well drained
Parent material: Gravelly residuum derived from granitic gneiss or from greenstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Catoctin and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Mt. Zion and similar soils

Composition: 5 percent
Landform: Concave footslopes, toeslopes, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MwB—Myersville gravelly loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Valleys
Note: Spring seeps are on some footslopes. In some pedons the substratum is sandier than where the soil is mapped over a granitic gneiss formation.

Component Description

Myersville and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of 60 inches or more
Drainage class: Well drained
Parent material: Gravelly residuum derived from granitic gneiss or from greenstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Catoctin and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Rohrersville and similar soils

Composition: 5 percent

Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MwC—Myersville gravelly loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Valleys
Note: Spring seeps are on some footslopes. In some pedons the substratum is sandier than where the soil is mapped over a granitic gneiss formation.

Component Description

Myersville and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of 60 inches or more
Drainage class: Well drained
Parent material: Gravelly residuum derived from granitic gneiss or from greenstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Mt. Zion and similar soils

Composition: 10 percent
Landform: Concave footslopes, toeslopes, and drainageways

Catoctin and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MwD—Myersville gravelly loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: Valleys
Note: Spring seeps are on some footslopes. In some pedons the substratum is sandier than that described where the soil is mapped over a granitic gneiss formation.

Component Description

Myersville and similar soils

Composition: 80 percent
Landform: Summits and backslopes
Slope: 15 to 25 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of 40 to 60 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from granitic gneiss or from greenstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 7.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Catoctin and similar soils

Composition: 15 percent
Landform: Summits and backslopes

Mt. Zion and similar soils

Composition: 5 percent
Landform: Concave footslopes, toeslopes, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Nollville Series

The Nollville series consists of deep, well drained soils. Permeability is moderate. These soils formed in residuum derived from argillaceous limestone and limy shale. Nollville soils are on convex ridges of low relief on uplands. Slopes range from 3 to 25 percent.

Nollville soils are similar to Duffield soils and commonly are mapped adjacent to Hagerstown, Pecktonville, Ryder, and Wurno soils. Nollville soils commonly are near Berks, Calvin, Klinesville, and Weikert soils. Duffield soils formed in residuum derived from impure limestone. They are deeper to bedrock and have fewer rock fragments in the solum than Nollville soils. Hagerstown soils formed in residuum derived from pure limestone, are very deep to bedrock, and have a clayey subsoil. Ryder and Wurno soils are shallow to bedrock and have more rock fragments in the solum than Nollville soils. Pecktonville soils formed in residuum derived from cherty limestone and have a water table below a depth of 40 inches. Berks, Calvin, Klinesville, and Weikert soils formed in residuum derived from acid shale and are shallower to bedrock than Nollville soils.

Typical pedon of Nollville channery silt loam, 15 to 25 percent slopes, in an east-facing, convex orchard, 1,600 feet south of Mason-Dixon line, 1,400 feet west of I-70; near Hancock; lat. 39 degrees 43 minutes 12 seconds N. and long. 78 degrees 11 minutes 25 seconds W.

Ap—0 to 12 inches; brown (10YR 4/3) channery silt loam; weak medium subangular blocky structure parting to weak fine granular; very friable; many fine and common medium and few coarse roots; few medium tubular pores and common fine and medium vesicular pores; 15 percent calcareous shale channers; neutral; abrupt smooth boundary.

Bt1—12 to 23 inches; brownish yellow (10YR 6/6) channery clay loam; common medium prominent olive yellow (2.5Y 6/8) lithochromic mottles; few medium prominent black (N 2.5/0) manganese stains on the surface of rock fragments; moderate medium subangular blocky structure parting to weak fine platy; friable; many fine roots; common medium tubular and vesicular pores, many fine tubular and vesicular pores, and few coarse vesicular pores; common coarse prominent discontinuous yellowish red (5YR 5/6) clay films on faces of peds and lining pores; 25 percent calcareous shale channers; neutral; clear wavy boundary.

Bt2—23 to 32 inches; yellowish red (5YR 5/6) channery silty clay; many medium prominent brownish yellow (10YR 6/8) lithochromic mottles; moderate coarse subangular blocky structure; firm; common fine and few medium roots; many fine vesicular and tubular pores; many prominent discontinuous clay films on faces of peds and lining pores; many medium distinct black (N 2.5/0) manganese stains on faces of peds and on rock fragments; 15 percent calcareous shale channers; slightly acid; gradual wavy boundary.

BC—32 to 40 inches; yellowish brown (5YR 5/6) channery silty clay loam; many medium prominent olive (2.5Y 6/8) lithochromic mottles; weak coarse subangular blocky structure parting to weak fine platy; friable; common medium and many fine roots; many fine tubular and vesicular pores and common medium tubular and few medium vesicular pores; common distinct discontinuous clay skins on rock fragments and on faces of peds; many fine distinct black (N 2.5/0) manganese stains lining pores and on rock fragments; 30 percent calcareous channers of which 20 percent are crushable under strong pressure; moderately acid, clear wavy boundary.

C—40 to 49 inches; yellowish red (5YR 4/6) very channery clay; many coarse prominent light red (2.5YR 6/6) mottles and many fine and medium grayish brown (10YR 5/2) and olive brown (2.5Y 4/4) lithochromic mottles; weak fine platy structure derived from paralithic contact; friable; common fine roots; many fine tubular and vesicular pores; common distinct discontinuous clay films on rock fragments and lining pores; many coarse distinct black (N 2.5/0) manganese stains on rock fragments; 75 percent rock fragments of which 40 percent are crushable under strong pressure; neutral; clear wavy boundary.

R—49 inches; strongly cemented, highly fractured bedrock; 10 percent yellowish red (5YR 4/6) silty clay loam in voids and fractures; few fine roots.

The solum ranges from 30 to 50 inches in thickness. Depth to bedrock is 40 to 60 inches. Fragments of shale and siltstone range from 5 to 25 percent in the A horizon, from 15 to 40 percent in the B horizon, and from 25 to 75 percent in the C horizon. Reaction ranges from strongly acid to neutral in the upper part of the solum and from strongly acid to slightly alkaline in the lower part of the solum and in the substratum.

The Ap horizon has a hue of 10YR or 7.5YR, value of 3 to 5, and chroma 3 or 4. It is silt loam or loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is silt loam, silty clay loam, silty clay, clay loam, or loam. Faint to prominent clay films are on faces of peds, on coarse fragments, and lining pores.

The BC horizon, where it occurs, has properties similar to those in the Bt horizon.

The C horizon has hue of 5YR or 10YR, value of 4 to 6, and chroma 4 to 8. It is silt loam, silty clay loam, or clay.

NoB—Nollville channery silt loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Nollville and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 40 to 60 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Ryder and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Swanpond and similar soils

Composition: 5 percent
Landform: Saddles and swales

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

NoC—Nollville channery silt loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Nollville and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 40 to 60 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Ryder and similar soils

Composition: 15 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

NoD—Nollville channery silt loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Nollville and similar soils

Composition: 85 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 40 to 60 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Ryder and similar soils

Composition: 15 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Opequon Series

The Opequon series consists of shallow, well drained soils. Permeability is moderate to slow. These soils formed in residuum derived from massive dolomitic and argillaceous limestone. They are on uplands in the central limestone valley of Washington County. Slopes range from 0 to 65 percent.

Opequon soils are similar to Ryder soils and commonly are mapped adjacent to Berks, Funkstown, Duffield, Hagerstown, Swanpond, and Weikert soils. Duffield and Hagerstown soils are very deep to bedrock and have a moderately permeable solum. Berks and Weikert soils formed in residuum derived from acid shale and are rapidly permeable. Funkstown soils are in concave drainageways on uplands, are subject to flooding, are very deep to bedrock, and are moderately well drained. Swanpond soils are in concave flats on uplands, are very deep to bedrock, and are moderately well drained. Rock outcrops are common on the same landscape as Opequon soils.

Typical pedon of Opequon silty clay loam, 3 to 8 percent slopes, on northwest-facing, convex cropland, 1,000 feet west of intersection of MD-40 and St. Pauls Road, 900 feet south of MD-40; near Clear Springs; lat. 39 degrees 39 minutes 23 seconds N. and long. 77 degrees 53 minutes 13 seconds W.

Ap1—0 to 4 inches; dark yellowish brown (10YR 4/4) silty clay loam; strong fine granular structure; friable; many fine and few medium roots; common fine and few medium tubular and few fine vesicular pores; 5 percent gravel; neutral; clear smooth boundary.

Ap2—4 to 7 inches; dark yellowish brown (10YR 4/4) silty clay; strong fine and medium angular blocky structure; firm; common fine and few medium roots; common fine and medium tubular and vesicular pores; 5 percent gravel; neutral; abrupt smooth boundary.

Bt1—7 to 14 inches; strong brown (7.5YR 5/8) silty clay; strong very coarse prismatic structure parting to strong medium subangular blocky; firm; common fine and few medium roots; many fine and medium vesicular pores and common fine, few medium, and few coarse tubular pores; many prominent continuous clay skins on faces of peds and lining pores; common fine distinct black (5YR 2.5/1) manganese stains; 5 percent channers; neutral; clear wavy boundary.

Bt2—14 to 18 inches; strong brown (7.5YR 5/6) clay; moderate very coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many fine and medium vesicular pores and few fine and medium tubular pores; many prominent continuous clay skins on faces of peds and lining pores; common fine distinct black (5YR 2.5/1) manganese stains on faces of peds; neutral; abrupt irregular boundary.

R—18 inches; dark bluish gray (5B 5/1), indurated, fractured limestone bedrock; fractures filled with strong brown (7.5YR 5/8) clay.

The solum ranges from 12 to 19 inches in thickness. Depth to bedrock ranges from 12 to 20 inches. Rock fragments range from 0 to 25 percent throughout. Reaction ranges from moderately acid to slightly alkaline.

The A horizon has hue of 7.5YR to 10YR, value of 3 to 5, and chroma 2 to 4. It is loam, silt loam, silty clay loam, or clay loam.

The Bt horizon has hue of 5YR to 10YR, value 4 or 5, and chroma 4 to 8. It is silty clay loam, silty clay, or clay.

OpA—Opequon silty clay loam, 0 to 3 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: Active and inactive sinkholes and depressions make up about 5 percent of this map unit.

Component Description

Opequon and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 0 to 3 percent
Texture of the surface layer: Silty clay loam

Depth to a restrictive feature: Bedrock (lithic) at a depth of 12 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Hagerstown and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Swanpond and similar soils

Composition: 5 percent
Landform: Flats on uplands

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

OpB—Opequon silty clay loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: Active and inactive sinkholes and depressions make up about 5 percent of this map unit.

Component Description

Opequon and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Silty clay loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 12 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Hagerstown and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Swanpond and similar soils

Composition: 5 percent
Landform: Flats on uplands

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

OpC—Opequon silty clay loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: Active and inactive sinkholes and depressions make up about 5 percent of this map unit.

Component Description

Opequon and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Silty clay loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 12 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Hagerstown and similar soils

Composition: 15 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

OrB—Opequon-Rock outcrop complex, 3 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: Active and inactive sinkholes and depressions make up about 5 percent of this map unit.

Component Description

Opequon and similar soils

Composition: 45 percent
Landform: Ridges
Slope: 3 to 8 percent
Texture of the surface layer: Silty clay loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 12 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 40 percent
Landform: Ridges
Slope: 3 to 8 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at the surface
Parent material: Limestone
Flooding: None

Additional Components

Hagerstown and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Swanpond and similar soils

Composition: 5 percent
Landform: Saddles and swales

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

OrC—Opequon-Rock outcrop complex, 8 to 15 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: Active and inactive sinkholes and depressions make up about 5 percent of this map unit.

Component Description

Opequon and similar soils

Composition: 45 percent
Landform: Ridges
Slope: 8 to 15 percent
Texture of the surface layer: Silty clay loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 12 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 40 percent
Landform: Ridges
Slope: 8 to 15 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at a depth of 0 inches
Parent material: Limestone
Flooding: None

Additional Components

Hagerstown and similar soils

Composition: 15 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

OrD—Opequon-Rock outcrop complex, 15 to 25 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: Active and inactive sinkholes and depressions make up about 5 percent of this map unit.

Component Description

Opequon and similar soils

Composition: 45 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Silty clay loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 12 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 40 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at the surface
Parent material: Limestone
Flooding: None

Additional Components

Hagerstown and similar soils

Composition: 15 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

OrF—Opequon-Rock outcrop complex, 25 to 65 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: In some areas rock outcrop takes in as much as 75 percent of this map unit.

Component Description

Opequon and similar soils

Composition: 45 percent
Landform: Ridges
Slope: 25 to 65 percent
Texture of the surface layer: Silty clay loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 12 to 20 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 40 percent
Landform: Ridges
Slope: 25 to 60 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at the surface
Parent material: Limestone
Flooding: None

Additional Components

Hagerstown and similar soils

Composition: 15 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Pecktonville Series

The Pecktonville series consists of very deep, well drained soils. Permeability is slow. These soils formed in residuum derived from limestone and interbedded shale, chert, and sandstone. They are on convex ridges on uplands in the western part of Washington County. Slopes range from 3 to 45 percent.

Pecktonville soils are similar to Hagerstown soils and commonly are mapped adjacent to Dekalb, Duffield, Hazleton, Nollville, Ryder, Sideling, and Wurno soils. Duffield, Hagerstown, and Nollville soils do not have a water table within a depth of 60 inches. Ryder and Wurno soils are moderately deep to bedrock and formed in residuum derived from calcareous shale. Dekalb and Hazleton soils formed in residuum derived from sandstone. Sideling soils formed in colluvium derived from sandstone and are moderately well drained. Rock outcrops and stones on the surface commonly are on the landscape with Pecktonville soils where adjacent to Dekalb soils.

Typical pedon of Pecktonville gravelly silt loam, 15 to 25 percent slopes, on east-facing, slightly concave, cropland, 1.25 miles south of Pennsylvania state line, 500 feet west of Indian Springs Road; in Pecktonville; lat. 39 degrees 42 minutes 26 seconds N. and long. 78 degrees 1 minutes 21 seconds W.

Ap1—0 to 7 inches; dark yellowish brown (10YR 3/4) gravelly silt loam; weak fine granular structure; very friable; many fine roots; 30 percent rock fragments; strongly acid; abrupt smooth boundary.

Ap2—7 to 11 inches; dark yellowish brown (10YR 3/4) gravelly silt loam; weak medium platy structure; friable; many fine roots; 20 percent rock fragments; strongly acid; abrupt smooth boundary.

BE—11 to 15 inches; strong brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; few fine roots; few medium tubular pores; 5 percent intrusions of dark yellowish brown (10YR 3/4) krotovinas in wormholes; 3 percent iron-manganese nodules; 10 percent rock fragments; moderately acid; clear wavy boundary.

Bt1—15 to 23 inches; yellowish red (5YR 4/6) silty clay; moderate medium subangular blocky structure; firm; slightly sticky, plastic; few fine roots; few fine and medium tubular pores; common distinct continuous clay films on faces of peds; 10 percent rock fragments; moderately acid; clear smooth boundary.

Bt2—23 to 32 inches; yellowish red (5YR 4/6) channery silty clay; weak medium angular blocky structure; firm; slightly sticky, plastic; few fine roots; few fine tubular pores; common distinct continuous clay films on faces of peds; 30 percent rock fragments; moderately acid; abrupt smooth boundary.

Bt3—32 to 48 inches; red (2.5YR 4/6) clay; many distinct brownish yellow (10YR 6/6) mottles derived from shale fragments; weak very fine angular blocky structure; very firm; slightly sticky, plastic; few fine roots; few fine tubular pores; many distinct discontinuous clay films on faces of peds; 14 percent iron-manganese nodules; moderately acid; clear smooth boundary.

Bt4—48 to 63 inches; red (2.5YR 4/6) silty clay; many medium prominent brownish yellow (10YR 6/6) mottles derived from shale fragments; weak very fine angular blocky structure; very firm; slightly sticky, plastic; few fine roots; few fine tubular pores; common fine prominent grayish brown (10YR 5/2) iron depletions; many distinct discontinuous clay films on faces of peds; 5 percent rock fragments; moderately acid; clear smooth boundary.

BC—63 to 75 inches; 55 percent yellowish brown (10YR 5/8) and 40 percent yellowish red (5YR 4/6) clay loam; moderate fine platy structure; friable; few distinct discontinuous clay films on faces of peds; moderately acid.

The solum is 40 to 70 inches in thickness. Depth to bedrock is more than 72 inches. Soil reaction ranges from very strongly acid to moderately acid throughout. Rock fragments range from 5 to 60 percent in the A, Ap, and BE horizons and from 0 to 35 percent in the Bt and BC horizons. Redoximorphic depletions range from 42 to 60 inches.

The Ap and A horizon have hue of 7.5YR or 10YR, value 3 to 5, and chroma 1 to 4. It is silt loam or loam.

The BE horizon has hue of 7.5YR or 10YR, value 4 to 6, and chroma 4 to 6. It is silt loam, silty clay loam, or loam.

The Bt horizon has hue of 2.5YR or 5YR, value 4 to 6, and chroma 6 to 8. It is silty clay loam, clay loam, silty clay, or clay.

The BC horizon has hue of 2.5YR to 10YR, value 4 to 8, and chroma 4 to 8. Typically, it is variegated. It is clay, silty clay loam, or clay loam.

PaB—Pecktonville gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Pecktonville and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Gravelly silt loam

Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 8.0 inches
Note: In some pedons the uppermost 20 inches is more than 35 percent rock fragments.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Ryder and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Unnamed soils

Composition: 5 percent
Landform: Depressions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

PaC—Pecktonville gravelly silt loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Pecktonville and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly silt loam
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 8.0 inches
Note: In some pedons the uppermost 20 inches is more than 35 percent rock fragments.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Ryder and similar soils

Composition: 15 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

PaD—Pecktonville gravelly silt loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Pecktonville and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 15 to 25 percent
Texture of the surface layer: Gravelly silt loam
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 8.0 inches
Note: In some pedons the uppermost 20 inches is more than 35 percent rock fragments.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Ryder and similar soils

Composition: 15 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

PcB—Pecktonville cobbly loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Pecktonville and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Cobbly loam
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 8.0 inches
Note: In some pedons the uppermost 20 inches is more than 35 percent rock fragments.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Ryder and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Unnamed soils

Composition: 5 percent
Landform: Depressions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

PcC—Pecktonville cobbly loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Pecktonville and similar soils

Composition: 85 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Cobbly loam
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 8.0 inches
Note: In some pedons the uppermost 20 inches is more than 35 percent rock fragments.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Ryder and similar soils

Composition: 15 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

PcD—Pecktonville cobbly loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Pecktonville and similar soils

Composition: 85 percent
Landform: Summits and backslopes; backslopes and footslopes on mountains
Slope: 15 to 25 percent
Texture of the surface layer: Cobbly loam
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 8.0 inches
Note: In some pedons the uppermost 20 inches is more than 35 percent rock fragments.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is

available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Ryder and similar soils

Composition: 15 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

PeE—Pecktonville-Rock outcrop complex, 25 to 45 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Pecktonville and similar soils

Composition: 55 percent
Landform: Backslopes and footslopes on mountains
Slope: 25 to 45 percent
Texture of the surface layer: Cobbly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 70 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 35 percent
Landform: Backslopes and footslopes on mountains
Slope: 25 to 45 percent
Texture of the surface layer: Unweathered bedrock (lithic) at the surface
Parent material: Limestone
Flooding: None

Additional Components

Opequon and similar soils

Composition: 10 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Philo Series

The Philo series consists of very deep, moderately well drained soils on flood plains adjacent to streams. These soils formed in acid alluvium eroded from shale and sandstone on uplands. Slopes range from 0 to 3 percent. Permeability is moderate.

Philo soils are similar to Lindside soils and are mapped adjacent to Atkins, Basher, Bigpool, Deposit, Combs, and Pope soils. Basher soils have a redder solum than Philo soils. Pope soils are well drained. Bigpool soils are on high flood plains along the Potomac River and are subject to rare flooding. Lindside soils have more silt and clay in the solum than Philo soils. Atkins soils are poorly drained and have a gray subsoil. Deposit soils are near high gradient flood plains and have more gravel and sand throughout the solum than Philo soils. Combs soils have a thick, dark brown surface layer and are well drained.

Typical pedon of Philo silt loam, on the flood plain of Licking Creek north of Pecktonville, 2,800 feet west of Slabtown Road and Licking Creek ford; lat. 39 degrees 41 minutes 39 seconds N. and long. 78 degrees 3 minutes 8 seconds W.

Ap1—0 to 7 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many fine and few medium roots; 5 percent rock fragments; neutral; clear smooth boundary.

Ap2—7 to 13 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure parting to moderate medium granular; friable; many fine and few medium roots; common fine tubular and vesicular pores and few medium tubular pores; 5 percent rock fragments; neutral; clear smooth boundary.

Bw1—13 to 21 inches; dark brown (7.5YR 4/4) loam; few medium prominent light yellowish brown (2.5Y 6/4) weathered shale chips and common fine distinct brown (10YR 5/3) mottles; moderate medium subangular blocky structure; friable; many fine and few medium roots; many fine tubular and vesicular pores, few coarse vesicular pores, and common medium tubular and vesicular pores; common fine faint strong brown (7.5YR 4/6) iron accumulations; 2 percent fragments of sandstone and shale; slightly acid; clear smooth boundary.

Bw2—21 to 33 inches; brown (10YR 4/3) sandy loam; moderate medium subangular blocky structure; friable; many fine and few medium roots; many medium and fine tubular and vesicular pores; many medium prominent very dark gray (5YR 3/1) manganese stains on faces of peds; common medium prominent yellowish red (5YR 4/6) iron accumulations and few medium iron concretions; strongly acid; abrupt smooth boundary.

BCg—33 to 47 inches; brown (7.5YR 5/3) loam; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; common medium tubular and vesicular pores; many fine tubular and vesicular pores; many fine yellowish red (7.5YR 5/6) iron accumulations on faces and interiors of peds; strongly acid; gradual smooth boundary.

Cg—47 to 70 inches; grayish brown (10YR 5/2) loam; weak fine subangular blocky structure parting to massive; friable; few fine roots; few fine tubular and vesicular pores; very strongly acid.

The solum ranges from 20 to 48 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments range from 0 to 20 percent in the solum and from 0 to 50 percent in the substratum. In unlimed areas reaction ranges from neutral to very strongly acid.

The A or Ap horizon has a hue of 10YR, value of 3 or 4, and chroma of 2 or 3. It is silt loam, loam, or fine sandy loam.

The Bw and BC horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 3 to 6. It is silt loam, loam, sandy loam, or fine sandy loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 0 to 4. It is silt loam, loam, sandy loam, loamy sand, or fine sandy loam.

Pg—Philo silt loam

Map Unit Setting

Landscape: River valleys

Component Description

Philo and similar soils

Composition: 85 percent
Landform: Flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Drainage class: Moderately well drained
Parent material: Loamy alluvium derived from shale and siltstone or from sandstone and siltstone
Flooding: Occasional
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 8.0 inches
Note: Some areas along Licking Creek have a high pH.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Atkins and similar soils

Composition: 10 percent
Landform: Flood plains

Deposit and similar soils

Composition: 5 percent
Landform: Flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Ph—Philo gravelly sandy loam

Map Unit Setting

Landscape: River valleys

Component Description

Philo and similar soils

Composition: 85 percent
Landform: Flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Gravelly sandy loam
Drainage class: Moderately well drained
Parent material: Loamy alluvium derived from shale and siltstone or from sandstone and siltstone
Flooding: Occasional
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 4.9 inches
Note: Some areas along Licking Creek have a high pH.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Atkins and similar soils

Composition: 10 percent
Landform: Depressions

Deposit and similar soils

Composition: 5 percent
Landform: Flood plains and narrow, high-gradient flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Pope Series

The Pope series consists of very deep, well drained soils. Permeability is moderate or moderately rapid. These soils formed in acid alluvium derived from soils derived from shale and sandstone on uplands. They are on flood plains along streams. Slopes range from 0 to 3 percent.

Pope soils are similar to Combs soils and commonly are mapped adjacent to Atkins, Basher, Bigpool, Deposit, Lindside, and Philo soils. Combs soils have a thick, dark brown or very dark grayish brown surface layer. They formed in material derived from limestone. Basher soils have a redder solum than Pope soils. Philo soils are moderately well drained. Bigpool soils are on high flood plains along the Potomac River and are subject to rare flooding. Lindside soils are moderately well drained and have more silt and clay in the solum. Atkins soils are poorly drained and have a gray subsoil. Deposit soils are near high gradient flood plains and have more gravel and sand throughout the solum than Pope soils.

Typical pedon of Pope fine sandy loam, on the flood plain of Licking Creek north of Pecktonville, 2,800 feet west of Slabtown Road and Licking Creek ford; lat. 39 degrees 41 minutes 42 seconds N. and long. 78 degrees 3 minutes 44 seconds W.

Ap1—0 to 6 inches; dark yellowish brown (10YR 4/4) fine sandy loam; moderate medium granular structure; friable; many fine and common medium roots; slightly alkaline; clear smooth boundary.

Ap2—6 to 12 inches; dark brown (10YR 4/3) fine sandy loam; moderate medium platy structure parting to weak medium subangular blocky; friable; many fine roots; many fine and common medium tubular and vesicular pores and few coarse vesicular pores; slightly alkaline; clear smooth boundary.

Bw1—12 to 32 inches; dark brown (10YR 4/3) fine sandy loam; moderate coarse subangular blocky structure parting to weak fine subangular blocky; friable; many fine roots; many medium tubular and vesicular pores, few coarse tubular pores, and common fine tubular and vesicular pores; neutral; gradual smooth boundary.

BC—32 to 48 inches; dark yellowish brown (10YR 4/4) sandy loam; weak coarse subangular blocky structure; friable; common fine roots; many medium tubular and vesicular pores, common fine tubular and vesicular pores, and few coarse tubular pores; neutral; abrupt smooth boundary.

C1—48 to 54 inches; variegated brownish yellow (10YR 6/6) and dark yellowish brown (10YR 4/4) sand; single grain; loose; few fine roots; common fine tubular and vesicular pores; slightly alkaline; clear wavy boundary.

C2—54 to 68 inches; brown (10YR 4/3) loamy sand; massive; very friable; few fine roots; common fine tubular and vesicular pores and few medium tubular pores; slightly alkaline.

The solum ranges from 20 to 40 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments range from 0 to 20 percent in the solum and from 0 to 60 percent in the substratum. In unlimed areas reaction ranges from slightly alkaline to strongly acid.

The A or Ap horizon has hue of 10YR, value of 4 to 5, and chroma of 3 to 5. It is sandy loam, fine sandy loam, loam, or silt loam.

The B and BC horizons have hue of 7.5YR to 10YR, value of 4 to 6, and chroma of 3 to 6. Reaction is sandy loam, fine sandy loam, loam, or silt loam.

The C horizon has hue of 7.5YR to 10YR, value of 4 to 6, and chroma of 3 to 6. It is loamy sand, sandy loam, sand, silt loam, or loam.

Pn—Pope fine sandy loam

Map Unit Setting

Landscape: River valleys

Component Description

Pope and similar soils

Composition: 85 percent
Landform: Flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Fine sandy loam
Drainage class: Well drained
Parent material: Loamy alluvium derived from shale and siltstone and from sandstone and siltstone

Flooding: Occasional
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches
Note: Some areas along Licking Creek have a high pH.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Deposit and similar soils

Composition: 10 percent
Landform: Flood plains

Atkins and similar soils

Composition: 5 percent
Landform: Flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Po—Pope gravelly loam

Map Unit Setting

Landscape: River valleys
Note: In some areas the surface layer of this soil is sandier.

Component Description

Pope and similar soils

Composition: 85 percent
Landform: Flood plains
Slope: 0 to 3 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Loamy alluvium derived from sandstone and siltstone or from shale and siltstone
Flooding: Occasional
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches
Note: Some areas along Licking Creek have a high pH.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Deposit and similar soils

Composition: 10 percent
Landform: Flood plains

Atkins and similar soils

Composition: 5 percent
Landform: Flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Qa—Quarry, limestone

Map Unit Setting

Landscape: Karst landscapes

Component Description

Quarry

Composition: 100 percent

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Qm—Quarry, marl

Map Unit Setting

Landscape: Karst landscapes

Component Description

Quarry

Composition: 100 percent

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Qr—Quarry, sandstone

Map Unit Setting

Landscape: Mountains

Component Description

Quarry

Composition: 100 percent

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Qs—Quarry, shale

Map Unit Setting

Landscape: Mountains and valleys

Component Description

Quarry

Composition: 100 percent

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Ravenrock Series

The Ravenrock series consists of very deep, well drained soils. Permeability is moderate. These soils formed in colluvium derived from metabasalt and other basic rocks. They are on backslopes and benches of mountains in the eastern part of Washington County. Slopes range from 8 to 65 percent.

Ravenrock soils are similar to Mt. Zion soils and commonly are mapped adjacent to Catoctin, Foxville, Highfield, Myersville, Rohrersville, and Lantz soils. Mt. Zion soils formed in the same parent material as Ravenrock soils and, on average, are less than 35 percent rock fragments throughout. They are moderately well drained, slowly permeable, and are lower on the landscape than Ravenrock soils. Catoctin soils formed in residuum derived from greenstone, are well drained, and have bedrock between depths of 20 and 40 inches. Highfield soils formed in residuum derived from metarhyolite and metaandisite, are well drained, and average less than 35 percent rock fragments throughout. Myersville soils formed in residuum derived from greenstone. They are well drained, on average are less than 35 percent rock fragments, and are moderately permeable. Rohrersville and Lantz soils are in lower, concave, broad flats and drainageways and are somewhat poorly drained and very poorly drained, respectively. Rock outcrops and boulders are common on the landscape with Ravenrock soils.

Typical pedon of Ravenrock gravelly loam, in an area of Ravenrock-Highfield-Rock outcrop complex, 25 to 65 percent slopes, on a convex side slope of a mountain; in a oak-hickory forest; near Highfield; lat. 39 degrees 37 minutes 37 seconds N. and long. 77 degrees 28 minutes 0 seconds W.

A—0 to 4 inches; brown or dark brown (7.5YR 5/6) gravelly loam; moderate very fine subangular blocky structure; friable; many medium roots; 15 percent gravel; slightly acid; clear wavy boundary.

BE—4 to 7 inches; strong brown (7.5YR 4/6) gravelly silt loam; moderate very fine subangular blocky structure; friable; common fine and medium roots; common very fine tubular pores; 20 percent gravel; moderately acid; gradual wavy boundary.

Bt1—7 to 16 inches; yellowish red (5YR 4/6) very gravelly silt loam; moderate very fine subangular blocky structure; friable; many medium and coarse roots; common very fine tubular pores; many distinct discontinuous clay skins on faces of peds and lining pores; 35 percent gravel; strongly acid; clear wavy boundary.

Bt2—16 to 34 inches; yellowish red (5YR 4/6) very gravelly clay loam; moderate medium subangular blocky structure; friable; common fine roots; common very fine tubular pores; many faint discontinuous clay films on faces of peds and lining pores; 35 percent gravel; strongly acid; abrupt wavy boundary.

2Bt3—34 to 43 inches; red (2.5YR 4/6) very gravelly clay loam; weak fine platy structure; firm; few fine roots; common very fine tubular pores; many distinct discontinuous clay films on faces of peds and lining pores; moderately acid; 25 percent gravel and 30 percent cobbles; moderately acid; abrupt wavy boundary.

2Bt4—43 to 57 inches; yellowish red (5YR 4/6) gravelly silty clay; moderate medium angular blocky structure; friable; many medium roots; few very fine vesicular pores; many distinct discontinuous clay films on faces of peds and lining pores; 15 percent gravel; strongly acid; abrupt irregular boundary.

2C—57 to 65 inches; yellowish red (5YR 4/6) gravelly clay loam; massive; firm; many fine roots; few very fine vesicular pores; common distinct yellowish red (5YR 5/6) iron accumulations; 25 percent gravel; strongly acid; abrupt irregular boundary;

R—65 to 80 inches; very strongly cemented metabasalt bedrock.

The solum ranges from 40 to 80 inches or more in thickness. Depth to bedrock is more than 60 inches. Rock fragments range from 5 to 50 percent on the surface and in the surface layer and from 35 to 70 percent in the solum and the substratum. Stones on the surface range to 50 percent. Outcrops of metabasalt commonly are on the landscape with Ravenrock soils and range from 0 to 25 percent. The seasonal high water table is below a depth of 40 inches. Reaction ranges from very strongly acid to slightly acid.

The A horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 2 to 4. It is silt loam or loam.

The BE horizon has hue of 5YR to 10YR, value of 4 or 6, and chroma 4 to 6. It is silt loam or loam.

The Bt horizon and the 2Bt horizon, where it occurs, have hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. In most pedons a lithologic discontinuity is in the lower part of the Bt horizon. The horizon is silt loam, clay loam, silty clay loam, silty clay, or clay.

The BC horizon, where it occurs, has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is sandy loam, loam, or silt loam.

The 2C horizon has hue of 2.5YR to 2.5Y, value of 4 or 6, and chroma of 4 to 8. It is sandy loam, loam, or silt loam.

RaC—Ravenrock gravelly loam, 3 to 15 percent slopes, extremely stony

Map Unit Setting

Landscape: Mountains
Note: In small, isolated areas the surface of this map unit is not stony.

Component Description

Ravenrock and similar soils

Composition: 85 percent
Landform: Backslopes and footslopes of mountains
Slope: 3 to 15 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly colluvium derived from greenstone
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 8.0 inches
Note: Some pedons do not have gravelly layers.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Highfield and similar soils

Composition: 10 percent
Landform: Backslopes and footslopes of mountains

Lantz and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

RaD—Ravenrock gravelly loam, 15 to 25 percent slopes, extremely stony

Map Unit Setting

Landscape: Mountains
Note: In small, isolated, concave areas the surface of this map unit is rubbly.

Component Description

Ravenrock and similar soils

Composition: 85 percent
Landform: Backslopes and footslopes on mountains
Slope: 15 to 25 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly colluvium derived from greenstone
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 8.0 inches
Note: Some pedons do not have gravelly layers. In some pedons bedrock is at a depth of less than 60 inches.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Catoctin and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Highfield and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Rohrersville and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

RcC—Ravenrock-Rohrersville complex, 3 to 15 percent slopes, extremely stony

Map Unit Setting

Landscape: Mountains
Note: In small, concave areas the surface of this map unit is rubbly.

Component Description

Ravenrock and similar soils

Composition: 45 percent
Landform: Backslopes and footslopes on mountains
Slope: 3 to 15 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly colluvium derived from greenstone
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rohrersville and similar soils

Composition: 45 percent
Landform: Head slopes, footslopes, and drainageways on mountains
Slope: 3 to 15 percent
Texture of the surface layer: Gravelly silt loam
Depth to a restrictive feature: Fragic properties at a depth of 30 to 40 inches
Drainage class: Somewhat poorly drained
Parent material: Loamy alluvium or colluvium derived from greenstone
Flooding: None
Water table: 1.0 to 1.5 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Highfield and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Lantz and similar soils

Composition: 5 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

ReC—Ravenrock-Highfield-Rock outcrop complex, 8 to 15 percent slopes

Map Unit Setting

Landscape: Mountains
Note: In small, concave areas the surface of this map unit is rubbly.

Component Description

Highfield and similar soils

Composition: 40 percent
Landform: Summits and backslopes of treads and risers on mountains
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 inches or more
Drainage class: Well drained
Parent material: Summits and backslopes of treads and risers on mountains
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Ravenrock and similar soils

Composition: 40 percent
Landform: Backslopes and footslopes on mountains
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly colluvium derived from greenstone
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 10 percent
Landform: Summits and backslopes of treads and risers on mountains

Additional Components

Catoctin and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Lantz and similar soils

Composition: 5 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

ReD—Ravenrock-Highfield-Rock outcrop complex, 15 to 25 percent slopes

Map Unit Setting

Landscape: Mountains
Note: In small, concave areas the surface of this map unit is rubbly.

Component Description

Highfield and similar soils

Composition: 40 percent
Landform: Summits and backslopes of treads and risers on mountains
Slope: 15 to 25 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 inches or more
Drainage class: Well drained
Parent material: Loamy residuum derived from greenstone
Flooding: None
Water table: 6.0 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Ravenrock and similar soils

Composition: 40 percent
Landform: Summits and backslopes of treads and risers on mountains
Slope: 15 to 25 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly colluvium derived from greenstone
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 10 percent
Landform: Greenstone

Additional Components

Catoctin and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Rohrersville and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

ReF—Ravenrock-Highfield-Rock outcrop complex, 25 to 65 percent slopes

Map Unit Setting

Landscape: Mountains

Component Description

Highfield and similar soils

Composition: 40 percent
Landform: Summits and backslopes of treads and risers on mountains
Slope: 25 to 65 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 70 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from greenstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Ravenrock and similar soils

Composition: 40 percent
Landform: Summits and backslopes of treads and risers on mountains
Slope: 25 to 65 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Gravelly colluvium derived from greenstone
Flooding: None
Water table: 3.5 to 6.0 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 10 percent
Landform: Greenstone

Additional Components

Catoctin and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Rohrersville Series

The Rohrersville series consists of very deep, somewhat poorly drained soils on lower footslopes, in heads of drainageways, and along drainage courses. Permeability is slow. These soils formed in local colluvial material or in soil creep over residuum derived from greenstone. They are on drainageways and concave foot slopes. Slopes range from 0 to 15 percent.

Rohrersville soils are similar to Lantz soils and commonly are mapped adjacent to Catoctin, Foxville, Highfield, Mt. Zion, Myersville, Ravenrock, and Weverton soils. Lantz soils are on in lower landscape positions or on broad flats. They are poorly drained and have a darker surface layer than Rohrersville soils. Catoctin soils have bedrock within a depth of 20 to 40 inches. Foxville soils formed in alluvial sediments and average more than 35 percent rock fragments throughout. Highfield, Mt. Zion, Myersville, and Ravenrock soils are all better drained and are higher on the landscape than Rohrersville soils.

Typical pedon of Rohrersville silt loam, in an area of Rohrersville-Lantz silt loams, 0 to 8 percent slopes, in a woodlot, about 1 mile east-northeast of Mt. Zion Church Road on Catoctin trail, 60 feet behind shelter in Catoctin Mountain Park; lat. 39 degrees 40 minutes 41 seconds N. and long. 77 degrees 29 minutes 14 seconds W.

Ap1—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; common medium and many fine and few coarse roots; 5 percent gravel; slightly acid; abrupt smooth boundary.

Ap2—5 to 9 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure parting to moderate fine granular; friable; common fine, medium, and coarse roots; 5 percent gravel; moderately acid; abrupt smooth boundary.

E—9 to 15 inches; light olive brown (2.5Y 5/3) silt loam; moderate medium platy structure; friable; common fine roots; few very fine prominent dark brown (7.5YR 3/4) iron concentrations; 5 percent gravel; moderately acid; clear smooth boundary.

Bt1—15 to 25 inches; light olive brown (2.5Y 5/4) silt loam; weak medium platy structure parting to strong fine subangular blocky; friable; common fine roots; common medium distinct yellowish brown (10YR 5/6) iron accumulations; common medium distinct light brownish gray (2.5YR 6/2) iron depletions; few fine prominent iron-manganese nodules; 5 percent gravel; 1 percent stones; strongly acid; clear wavy boundary.

Bt2—25 to 31 inches; brown (7.5YR 4/4) silt loam; weak medium platy structure parting to weak fine subangular blocky; friable; few fine and medium roots; many medium faint strong brown (7.5YR 5/6) iron accumulations; few medium prominent grayish brown (2.5Y 5/2) iron depletions on faces of peds; common fine dark brown (7.5YR 3/3) iron concretions and common fine prominent discontinuous light olive brown (2.5Y 5/3) clay films on faces of prisms; 5 percent gravel; moderately acid; clear wavy boundary.

Bt3—31 to 43 inches; strong brown (7.5YR 4/6) loam; weak very coarse prismatic structure parting to moderate thin platy; firm; few fine roots on faces of peds; few fine vesicular pores; common medium prominent grayish green (5GY 5/1) iron depletions along roots; common fine prominent iron-manganese concretions and common fine iron-manganese stains; common medium prominent light olive brown (2.5Y 5/3) clay films on faces of prisms; 11 percent channers; moderately acid; clear wavy boundary.

Btg—43 to 55 inches; grayish brown (2.5Y 5/2) loam; weak very coarse prismatic structure parting to weak medium platy parting to weak fine subangular blocky; firm; many fine vesicular pores; few medium vesicular pores and few fine tubular pores; many coarse prominent strong brown (7.5YR 4/6) iron accumulations and common fine and medium prominent iron concretions; common medium prominent discontinuous light olive brown (2.5Y 5/3) clay films on faces of prisms; 12 percent channers; moderately acid; clear wavy boundary.

BC—55 to 62 inches; yellowish red (5YR 4/6) silt loam; weak medium subangular blocky structure; firm; few fine roots; few fine vesicular pores; common fine prominent grayish brown (2.5Y 5/2) iron depletions; common fine prominent iron-manganese stains; 5 percent channers; abrupt irregular boundary.

R—62 inches; very strongly cemented greenstone bedrock.

The solum ranges from 30 to 60 inches in thickness. Bedrock is at a depth of more than 60 inches. Rock fragments range from 0 to 10 percent in the surface layer and the subsoil and from 5 to 25 in the substratum. In unlimed areas reaction is slightly acid to very strongly acid.

The A horizon has hue of 10YR to 5Y, value of 3 or 4, and chroma of 2 to 4. It is silt loam or loam.

The BE horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 3 to 6. It is silt loam or loam.

The Bt horizon has hue of 7.5YR to 5Y, value of 4 or 5, and chroma of 3 to 6. It is silt loam, loam, or silty clay loam. The Btg horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 or 2. It has the same texture as the Bt horizon. Redoximorphic features are common.

The BC and C horizons have hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 6. It is silt loam, loam, or silty clay loam.

RhB—Rohrersville-Lantz silt loams, 0 to 8 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Rohrersville and similar soils

Composition: 55 percent
Landform: Swales, depressions, and drainageways
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Fragic properties at 30 to 40 inches
Drainage class: Somewhat poorly drained
Parent material: Loamy colluvium or alluvium derived from greenstone
Flooding: None
Water table: 1.0 to 1.5 feet
Available water capacity: Average of 8.0 inches
Note: This component has a sandy substratum where mapped over granitic gneiss material.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Lantz and similar soils

Composition: 40 percent
Landform: Depressions
Slope: 0 to 8 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 80 inches
Drainage class: Very poorly drained

Parent material: Loamy alluvium or colluvium derived from greenstone
Flooding: Rare
Water table: 0.0 to 0.5 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Mt. Zion and similar soils

Composition: 3 percent
Landform: Convex footslopes and toeslopes

Hatboro and similar soils

Composition: 2 percent
Landform: Flood plains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Ryder Series

The Ryder series consists of moderately deep, well drained soils. Permeability is moderate. These soils formed in residuum derived from calcareous shale limestone. They are on convex uplands near low ridges in the central limestone valley of Washington County. Slopes range from 0 to 25 percent.

Ryder soils are similar to Opequon and Wurno soils and commonly are mapped adjacent to Dryrun, Duffield, Funkstown, Hagerstown, Murrill, Nollville, Ryder, and Swanpond soils. Opequon soil have bedrock between depths of 10 and 20 inches, are redder in the subsoil than Ryder soils, and average more than 35 percent clay throughout. Wurno soils are on convex, calcareous shale ridges, average more than 35 percent rock fragments throughout, and are shallow to bedrock. Dryrun soils are on gently sloping, broad, alluvial fans, are moderately well drained, and average more than 35 percent rock fragments throughout. Duffield, Hagerstown, and Nollville soils are deeper to bedrock and have fewer rock fragments in the solum than Ryder soils. Funkstown soils are in concave drainageways on uplands. They are subject to flooding, are very deep, and are moderately well drained. Murrill soils are on convex, colluvial fans and are very deep to bedrock. Swanpond soils are in concave flats on uplands, and are very deep, slowly permeable, and moderately well drained.

Typical pedon of Ryder channery silt loam, in an area of Ryder-Nollville channery silt loams, 8 to 15 percent slopes, very rocky, in a west-facing woodlot, 1,200 feet west of the White Hall Road underpass on I-70, 350 feet south of I-70; near Funkstown; lat. 39 degrees 35 minutes 42 s, long. 77 degrees 39 minutes 38 s.

A—0 to 1 inch; very dark grayish brown (10YR 3/2) channery silt loam; weak fine and medium subangular blocky structure; friable; many fine and medium and few coarse roots; common fine tubular pores; 20 percent shaly limestone channers; neutral; abrupt smooth boundary.

Ap—1 to 8 inches; brown (10YR 5/3) channery silt loam; weak fine and medium subangular blocky structure; friable; many fine and medium and few coarse roots; common medium and few coarse tubular pores; 20 percent shaly limestone channers; moderately acid; clear smooth boundary.

EB—8 to 13 inches; light yellowish brown (10YR 6/4) silt loam; weak medium platy structure; firm; common fine and few medium roots; many fine and medium tubular pores and many fine vesicular pores; common coarse tubular pores; 5 percent shaly limestone channers; strongly acid; clear wavy boundary.

Bt1—13 to 20 inches; yellowish brown (10YR 5/4) silt loam; moderate fine subangular blocky structure; friable; common fine roots; many fine tubular and vesicular pores and common medium and coarse tubular pores; common distinct discontinuous clay skins on faces of peds; 10 percent shaly limestone channers; slightly acid; gradual smooth boundary.

Bt2—20 to 28 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; common fine and few medium tubular and vesicular pores; common distinct very dark gray (N 3/0) manganese stains; common distinct discontinuous clay skins on faces of peds and in pores; 15 percent shaly limestone channers; slightly acid; clear wavy boundary.

C—28 to 39 inches; yellowish brown (10YR 5/4) very channery silty clay loam; common coarse distinct strong brown (7.5YR 5/8) and common medium faint brownish yellow (10YR 6/8) lithochromic mottles; massive; friable; common fine roots; common fine tubular pores; few distinct discontinuous clay skins on coarse fragments; 40 percent shaly limestone channers; slightly acid; abrupt smooth boundary.

R—39 inches; strongly cemented limestone bedrock.

The solum ranges from 20 to 30 inches in thickness. Depth to bedrock ranges form 20 to 40 inches. Fragments of limestone and shale range from 0 to 25 percent in the A horizon, from 0 to 40 percent in the Bt horizon, and from 20 to 50 percent in the C horizon. Where limed reaction ranges from neutral to moderately acid. In unlimed areas it is slightly acid to strongly acid.

The Ap horizon has hue of 10YR, value of 3 or 5, and chroma of 2 or 4. It is silt loam or silty clay loam.

The EB horizon has hue of 10YR to 2.5Y, value of 5 or 6, and chroma of 2 to 4. It is silt loam or loam.

The Bt horizon has hue of 7.5YR to 10YR, value of 5 or 6, and chroma of 4 to 6. It is silt loam, loam, or silty clay loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6. It is silty clay loam, silt loam, or loam.

RmB—Ryder-Duffield channery silt loams, 3 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Ryder and similar soils

Composition: 55 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 24 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 5.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Duffield and similar soils

Composition: 40 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 48 to 99 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Swanpond and similar soils

Composition: 5 percent
Landform: Saddles and swales

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

RmC—Ryder-Duffield channery silt loams, 8 to 15 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Ryder and similar soils

Composition: 55 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 24 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 5.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Duffield and similar soils

Composition: 40 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Swanpond and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

RmD—Ryder-Duffield channery silt loams, 15 to 25 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Ryder and similar soils

Composition: 50 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 24 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 4.8 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Duffield and similar soils

Composition: 35 percent
Landform: Summits and backslopes
Slope: 15 to 25 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 99 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

RnB—Ryder-Nollville channery silt loams, 3 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Ryder and similar soils

Composition: 55 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 24 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 5.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is

available in the appropriate table of this publication (see "Summary of Tables").

Nollville and similar soils

Composition: 40 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 40 to 60 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Swanpond and similar soils

Composition: 5 percent
Landform: Saddles and swales

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

RnC—Ryder-Nollville channery silt loams, 8 to 15 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Ryder and similar soils

Composition: 55 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 24 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 5.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Nollville and similar soils

Composition: 40 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 40 to 60 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Swanpond and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

RnD—Ryder-Nollville channery silt loams, 15 to 25 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Ryder and similar soils

Composition: 60 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 24 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone

Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 5.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Nollville and similar soils

Composition: 30 percent
Landform: Summits and backslopes
Slope: 15 to 25 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 40 to 60 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

RvC—Ryder-Nollville, channery silt loams, 8 to 15 percent slopes, very rocky

Map Unit Setting

Landscape: Karst landscapes

Component Description

Ryder and similar soils

Composition: 55 percent
Landform: Ridges
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 4.7 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Nollville and similar soils

Composition: 40 percent
Landform: Ridges
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 40 to 60 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Swanpond and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

RyB—Ryder-Rock outcrop complex, 3 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Ryder and similar soils

Composition: 45 percent
Landform: Ridges
Slope: 3 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained

Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 4.7 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 40 percent
Landform: Ridges
Slope: 3 to 8 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at the surface
Parent material: Shaly limestone
Flooding: None

Additional Components

Duffield and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Swanpond and similar soils

Composition: 5 percent
Landform: Saddles and swales

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

RyC—Ryder-Rock outcrop complex, 8 to 15 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Ryder and similar soils

Composition: 45 percent
Landform: Ridges
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 4.7 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 40 percent
Landform: Ridges
Slope: 8 to 15 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at the surface
Parent material: Shaly limestone
Flooding: None

Additional Components

Duffield and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Swanpond and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

RyD—Ryder-Rock outcrop complex, 15 to 25 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Ryder and similar soils

Composition: 45 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained

Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 4.4 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Rock outcrop

Composition: 40 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Unweathered bedrock
Depth to a restrictive feature: Bedrock (lithic) at the surface
Parent material: Shaly limestone
Flooding: None

Additional Components

Duffield and similar soils

Composition: 15 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Sideling Series

The Sideling series consists of very deep, moderately well drained soils. Permeability is slow. These soils formed in colluvium derived from acid sandstone over residuum derived from shale. They are on footslopes of mountains and on colluvial fans below ridges capped by sandstone in the western part of Washington County. Slopes range from 3 to 25 percent.

Sideling soils are similar to Buchanan soils and commonly are mapped adjacent to Berks, Calvin, Dekalb, Hazleton, Klinesville, and Weikert soils. Buchanan soils have a dense fragipan in the solum. Berks, Calvin, Dekalb, Klinesville, and Weikert soils are moderately deep or shallow to bedrock and formed in residuum. Hazleton soils are rapidly permeable and well drained.

Typical pedon of Sideling gravelly loam, 15 to 25 percent slopes, extremely stony, in a west-facing, concave oak-hickory forest, 2.2 miles north of access road to communications tower and the overpass at Lanes Run, 400 feet east of Lanes Run; near Forsythe; lat. 39 degrees 42 minutes 29 seconds N. and long. 77 degrees 57 minutes 37 seconds W.

Oi—0 to 2 inches; partly decomposed leaves, twigs, and roots; 6 percent stones on and in the surface layer.

A—2 to 4 inches; dark yellowish brown (10YR 3/4) gravelly loam; moderate fine granular structure; very friable; many fine and medium roots; few fine tubular and vesicular pores; 20 percent sandstone gravel and 3 percent sandstone stones; moderately acid; abrupt smooth boundary.

BE—4 to 12 inches; light yellowish brown (10YR 6/4) gravelly loam; moderate fine and medium subangular blocky structure; friable; many fine and medium and common coarse roots; many fine and medium and common coarse tubular pores; 17 percent sandstone gravel and 1 percent sandstone flags; strongly acid; clear wavy boundary.

Bt1—12 to 29 inches; strong brown (7.5YR 5/6) gravelly loam; moderate medium subangular blocky structure; friable; many fine roots; many fine tubular and vesicular pores; common distinct discontinuous clay films in pores, on faces of peds, and on rock fragments; 15 percent sandstone gravel and 1 percent sandstone flags; strongly acid; clear wavy boundary.

Bt2—29 to 38 inches; strong brown (7.5YR 5/6) gravelly clay loam; moderate medium subangular blocky structure; firm; few fine roots; few fine vesicular and tubular pores; many distinct discontinuous clay films in pores and on faces of peds; 25 percent sandstone gravel, 5 percent shale channers, and 2 percent sandstone cobbles; very strongly acid; clear wavy boundary.

2Bt3—38 to 55 inches; yellowish red (5YR 5/6) channery silty clay loam; common coarse prominent light yellowish brown (2.5Y 6/4) mottles; moderate coarse subangular blocky structure parting to weak thin platy; friable; few fine roots; few fine vesicular and tubular pores; common fine and medium prominent grayish brown (10YR 5/2) iron depletions; common medium distinct strong brown (7.5YR 5/6) iron accumulations; many distinct discontinuous clay films in pores, on faces of peds, and on rock fragments; few fine and medium black (10YR 2/1) manganese masses; 5 percent sandstone gravel and 15 percent shale channers; very strongly acid; clear wavy boundary.

2BC—55 to 74 inches; yellowish red (5YR 5/6) channery clay loam; weak medium subangular blocky structure; friable; few medium vesicular pores; common medium prominent light grayish brown (10YR 6/2) iron depletions; common medium prominent yellowish brown (10YR 5/8) iron accumulations; common distinct discontinuous clay films in pores, on faces of peds, and surrounding rock fragments; 5 percent sandstone gravel and 25 percent shale channers; very strongly acid; clear wavy boundary.

The solum ranges from 40 to 80 inches in thickness. Depth to lithologic discontinuity is 30 to 60 inches. Depth to bedrock is more than 60 inches. Content of rock fragments ranges from 10 to 45 percent in the solum and from 15 to 60 percent in the substratum. Rock fragments consist of sandstone gravel, cobbles, and stones in the upper part of the solum. Channers and flags of both acid and calcareous shale are dominant in the lower part of the solum and in the substratum. Rock fragments make up less than 35 percent in the particle size control section. Reaction ranges from slightly acid to extremely acid throughout.

The A and Ap horizons have hue of 10YR, value of 2 to 4, and chroma of 1 to 4. They are silt loam or loam. They are very strongly acid to moderately acid.

The E horizon, where it occurs, and the BE horizon have hue of 10YR, value of 4 to 6, and chroma 4 to 8. Textures are silt loam and loam.

The Bt Horizon has hue of 5YR to 7.5YR, value 4 to 6, and chroma 4 to 8. In some places the 2Bt horizon has hue of 2.5YR. The Bt horizon is silt loam, loam, clay loam, or silty clay loam. The 2Bt horizon commonly includes clay.

The 2BC horizon has hue of 5YR to 10YR, value 4 to 6, and chroma 4 to 8. It is loam, silt loam, silty clay loam, or clay loam.

SdB—Sideling gravelly loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Mountains
Note: The surface on some concave landscapes is very stony.

Component Description

Sideling and similar soils

Composition: 85 percent
Landform: Backslopes and footslopes of mountains
Slope: 3 to 8 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 72 inches or more
Drainage class: Moderately well drained
Parent material: Loamy colluvium derived from sandstone and siltstone or from shale and siltstone
Flooding: None
Water table: 2.5 to 4.0 feet
Available water capacity: Average of 7.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Berks and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Brinkerton and similar soils

Composition: 5 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SdC—Sideling gravelly loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Mountains
Note: The surface of some concave landscapes is very stony.

Component Description

Sideling and similar soils

Composition: 85 percent
Landform: Backslopes and footslopes on mountains
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 6 feet or more
Drainage class: Moderately well drained
Parent material: Loamy colluvium derived from sandstone and siltstone or from shale and siltstone
Flooding: None
Water table: 2.5 to 4.0 feet
Available water capacity: Average of 7.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is

available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Berks and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Brinkerton and similar soils

Composition: 5 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SdD—Sideling gravelly loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: Mountains
Note: The surface of some concave landscapes is very stony.

Component Description

Sideling and similar soils

Composition: 85 percent
Landform: Backslopes and footslopes on mountains
Slope: 15 to 25 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 72 to 72 inches
Drainage class: Moderately well drained
Parent material: Loamy colluvium derived from sandstone and siltstone or from shale and siltstone
Flooding: None
Water table: 2.5 to 4.0 feet
Available water capacity: Average of 7.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Berks and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Clearbrook and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SgB—Sideling gravelly loam, 3 to 8 percent slopes, extremely stony

Map Unit Setting

Landscape: Mountains

Component Description

Sideling and similar soils

Composition: 85 percent
Landform: Backslopes and footslopes on mountains
Slope: 3 to 8 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 72 inches or more
Drainage class: Moderately well drained
Parent material: Loamy colluvium derived from sandstone and siltstone or from shale and siltstone
Flooding: None
Water table: 2.5 to 4.0 feet
Available water capacity: Average of 7.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Berks and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Andover and similar soils

Composition: 5 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SgC—Sideling gravelly loam, 8 to 15 percent slopes, extremely stony

Map Unit Setting

Landscape: Mountains

Component Description

Sideling and similar soils

Composition: 85 percent
Landform: Backslopes and footslopes on mountains
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 72 inches or more
Drainage class: Moderately well drained
Parent material: Loamy colluvium derived from sandstone and siltstone or from shale and siltstone
Flooding: None
Water table: 2.5 to 4.0 feet
Available water capacity: Average of 7.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Berks and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Andover and similar soils

Composition: 5 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SgD—Sideling gravelly loam, 15 to 25 percent slopes, extremely stony

Map Unit Setting

Landscape: Mountains

Component Description

Sideling and similar soils

Composition: 85 percent
Landform: Backslopes and footslopes on mountains
Slope: 15 to 25 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 72 inches or more
Drainage class: Moderately well drained
Parent material: Loamy colluvium derived from sandstone and siltstone or from shale and siltstone
Flooding: None
Water table: 2.5 to 4.0 feet
Available water capacity: Average of 7.3 inches
Note: In some areas on eroded backslopes and shoulder positions, the underlying shale bedrock is at a depth of less than 60 inches.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Hazleton and similar soils

Composition: 10 percent
Landform: Shoulders and backslopes of mountains

Andover and similar soils

Composition: 5 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Swanpond Series

The Swanpond series consists of very deep, moderately well drained soils. Permeability is slow. These soils formed in residuum derived from calcareous shale and limestone. They are on broad, flat summits, on backslopes, in depressions, and in drainage swales on uplands. Slopes range from 0 to 8 percent.

Swanpond soils are similar to Hagerstown soils and commonly are mapped adjacent to Duffield, Funkstown, Nollville, Opequon, and Ryder soils. Hagerstown, Duffield, Nollville, Opequon, and Ryder soils are well drained, average less than 60 percent clay throughout, and are on convex uplands adjacent to Swanpond soils. Opequon and Ryder soils have bedrock within a depth of 40 inches. Funkstown soils are in drainageways and are subject to flooding, average less than 35 percent clay in the solum, and are as much as 30 percent rock fragments in the upper part of the solum.

Typical pedon of Swanpond silt loam, 0 to 3 percent slopes, on cropland, about 1,600 feet west of Cedar Ridge Road and 2,700 feet north of MD-68; near Pinesburg; elevation of 460 feet; lat. 39 degrees 38 minutes 22 seconds N. and long. 77 degrees 52 minutes 2 seconds W.

Ap1—0 to 5 inches; brown (10YR 4/3) silt loam; weak fine and medium platy structure; friable; many fine and common medium roots; common medium and common fine tubular pores; 3 percent gravel; slightly acid; clear smooth boundary.

Ap2—5 to 12 inches; brown (10YR 4/3) silt loam; weak coarse subangular blocky structure parting to weak medium platy; slightly firm; many fine and common medium roots; many fine and medium tubular pores and common medium vesicular pores; 3 percent gravel; slightly acid; clear wavy boundary.

Bt1—12 to 23 inches; yellowish brown (10YR 5/8) clay; weak coarse subangular blocky structure parting to moderate medium subangular blocky; firm; common fine and few medium roots; common fine, many medium, and few coarse tubular pores; common fine prominent very dark gray (5YR 3/1) manganese stains on faces of peds and lining some pores; few fine prominent very dark gray (5YR 3/1) manganese concretions; many fine and medium distinct dark yellowish brown (10YR 4/4) organic stains and material lining the pores; many distinct continuous clay skins in pores and on faces of peds; 1 percent gravel; neutral; gradual wavy boundary.

Bt2—23 to 37 inches; brownish yellow (10YR 6/8) clay; many medium prominent olive yellow (2.5Y 6/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky and strong fine angular blocky; friable; few fine roots; common fine and medium tubular pores; many medium prominent light brownish gray (2.5Y 6/2) and many medium prominent gray (2.5Y 5/1) iron depletions; common fine and medium dark yellowish brown (10YR 4/4) organic material lining pores; few fine prominent iron-manganese stains; many distinct continuous clay skins on faces of peds; slightly acid; clear irregular boundary.

Bt3—37 to 51 inches; brownish yellow (10YR 6/8) clay; many medium distinct olive yellow (2.5Y6/6) mottles; weak coarse prismatic parting to moderate medium subangular blocky parting to moderate fine angular blocky; friable; few fine roots; many fine tubular pores; common medium tubular pores; many medium iron depletions; few fine and medium very dark grayish brown (10YR 3/2) krotovinas filling worm channels; many discontinuous clay films on faces of peds; slightly acid; clear irregular boundary.

Bt4—51 to 70 inches; olive yellow (7.5YR 6/6) clay; moderate medium prismatic structure parting to moderate medium subangular blocky and moderate fine subangular blocky; friable; common fine and few coarse and medium tubular pores; many medium distinct light brownish gray (2.5Y 6/2) iron depletions; common fine prominent strong brown (7.5YR 5/6) iron accumulations; few fine dark yellowish brown (10YR 4/4) organic material lining pores; common medium prominent iron-manganese stains; many distinct discontinuous clay films on faces of peds; slightly acid; clear wavy boundary.

BC—70 to 73 inches; strong brown (7.5YR 5/8) 50 percent and yellowish brown (10YR 5/8) 35 percent silty clay; common fine prominent light yellowish brown (2.5Y 6/4) mottles; weak medium platy structure parting to moderate medium subangular blocky in places; friable; few medium tubular pores; few fine prominent light gray (2.5Y 6/1) iron depletions; few fine dark yellowish brown (10YR 4/4) organic stains lining pores; few fine iron-manganese stains; few distinct discontinuous clay films on faces of peds; slightly acid.

The solum ranges from 50 to 75 inches in thickness. Depth to bedrock is more than 60 inches. Fragments of gravel and channers make up as much as 20 percent throughout the profile. Reaction ranges from moderately acid to slightly alkaline.

The Ap horizon has hue of 10YR, value of 3 or 5, and chroma of 3 to 5. It is silt loam or silty clay loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is silty clay or clay.

The BC horizon has hue of 7.5YR or 5YR, value of 4 to 5, and chroma of 4 to 8. It is silty clay or clay.

SpA—Swanpond silt loam, 0 to 3 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Swanpond and similar soils

Composition: 85 percent
Landform: Upland flats

Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Drainage class: Moderately well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 2.5 to 3.5 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Hagerstown and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Funkstown and similar soils

Composition: 3 percent
Landform: Summits and backslopes

Opequon and similar soils

Composition: 2 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SpB—Swanpond silt loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Swanpond and similar soils

Composition: 85 percent
Landform: Upland flats
Slope: 3 to 8 percent
Texture of the surface layer: Silt loam
Drainage class: Moderately well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 2.5 to 3.5 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Hagerstown and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Opequon and similar soils

Composition: 3 percent
Landform: Summits and backslopes

Funkstown and similar soils

Composition: 2 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SsA—Swanpond-Funkstown silt loams, 0 to 3 percent slopes

Map Unit Setting

Landscape: Karst landscapes

Component Description

Swanpond and similar soils

Composition: 60 percent
Landform: Saddles and swales
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Drainage class: Moderately well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 2.5 to 3.5 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Funkstown and similar soils

Composition: 35 percent
Landform: Swales, depressions, and drainageways
Slope: 0 to 3 percent

Texture of the surface layer: Silt loam
Drainage class: Moderately well drained
Parent material: Loamy alluvium and colluvium over limestone
Flooding: Frequent
Water table: 2.0 to 3.5 feet
Available water capacity: Average of 9.4 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Hagerstown and similar soils

Composition: 5 percent
Landform: Upland flats

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SuA—Swanpond-Funkstown-Urban land complex, 0 to 3 percent slopes

Map Unit Setting

Landscape: Karst landscapes
Note: Water is ponded after storms because of rapid runoff from parking lots and roads.

Component Description

Funkstown and similar soils

Composition: 35 percent
Landform: Swales, depressions, and drainageways
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Drainage class: Moderately well drained
Parent material: Loamy alluvium and colluvium over limestone
Flooding: Frequent
Water table: 2.0 to 3.5 feet
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Swanpond and similar soils

Composition: 35 percent
Landform: Upland flats
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Drainage class: Moderately well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 2.5 to 3.5 feet
Available water capacity: Average of 9.5 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Urban land

Composition: 20 percent
Landform: Man influenced
Slope: 0 to 3 percent
Texture of the surface layer: Concrete and asphalt
Depth to a restrictive feature: Concrete surface
Parent material: Man influenced
Flooding: None

Additional Components

Hagerstown and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Talladega Series

The Talladega series consists of shallow to moderately deep, cyclic soils on uplands. These soils formed in residuum derived from phyllite. These soils are on convex uplands in Pleasant Valley, Washington County. Bedrock ranges from 10 to 40 inches deep. Permeability is moderate or moderately rapid. Slopes range from 3 to 25 percent.

Talladega soils are similar to Hazel and Catoctin soils and commonly are adjacent to Bagtown, Braddock, Lantz, Myersville, Rohrersville, Thurmont, Trego, and Weverton soils. Hazel soils are less than 18 percent clay throughout and average less than 35 percent rock fragments. Catoctin soils have bedrock between depths of 20 and 40 inches. They formed in residuum derived from greenstone. Bagtown, Braddock, Thurmont, Trego, and Weverton soils overlie bedrock at a depth of more than 40 inches. They formed in mixed, colluvial sediments of quartzite and phyllite on footslopes and backslopes of mountains. Lantz, Mt. Zion, Myersville, and Rohrersville soils formed in material derived from greenstone. They overlie bedrock at a depth of more than 40 inches.

Typical pedon of Talladega channery silt loam, 3 to 8 percent slopes, about 200 feet south of Hoffmaster Road and 600 feet east of Harpers Ferry Road; near Samples Manor; lat. 39 degrees 22 minutes 6 seconds N. and long. 77 degrees 43 minutes 6 seconds W.

Ap—0 to 10 inches; brown (7.5YR 4/4) channery silt loam; moderate fine subangular blocky structure; friable; many fine roots; few fine tubular pores; 20 percent channers; neutral; abrupt wavy boundary.

Bt1—10 to 20 inches; strong brown (7.5YR 5/6) very channery silt loam; moderate medium subangular blocky structure; friable; many fine roots; common fine tubular pores and few fine and medium vesicular pores; common distinct discontinuous clay films; 35 percent channers; moderately acid; gradual discontinuous boundary.

Bt2—20 to 27 inches; yellowish brown (10YR 5/6) very channery loam; common fine distinct light olive brown (2.5Y 5/3) mottles; weak medium subangular blocky structure; friable; common fine roots; few fine tubular pores and common fine and few medium vesicular pores; common distinct discontinuous strong brown (7.5YR 5/6) clay films; 40 percent channers; strongly acid; abrupt irregular boundary.

Cr—27 to 77 inches; light yellowish brown (2.5Y 6/3) and pale yellow (2.5Y 7/4) phyllite and schist bedrock; moderately cemented; fractures in the rock filled with variegated brownish yellow (10YR 6/8), strong brown (7.5YR 5/6), and yellowish red (5YR 5/6) extremely channery loam; common medium prominent black (N 2/0) manganese stains on rock fragments; few fine roots moving down between the fractures; many prominent patchy red (2.5YR 4/6) clay films surrounding rock fragments; 90 percent channers of which 5 to 30 percent are crushable under strong pressure.

Depth to nonconforming bedrock ranges from 10 to 40 inches. The bedrock is light olive brown and light yellowish brown to very dark gray phyllite of the Harpers formation. Rock fragments range from 15 to 60 percent in the solum, which has a discontinuous argillic horizon. In unlimed areas reaction ranges from slightly acid to strongly acid.

The A horizon has hue of 10YR to 7.5YR, value of 3 to 5, and chroma of 3 to 6. It is loam or silt loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is loam, silt loam, or clay loam. In places the argillic horizon is discontinuous.

The C horizon, where it occurs, is variegated and has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 8. In some pedons isolated areas have hue of 5YR. It is loam, silt loam, or clay loam.

TaB—Talladega channery silt loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Talladega and similar soils

Composition: 80 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from phyllite
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.8 inches
Note: In some broad, flat areas bedrock is at a depth of more than 4 feet.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Trego and similar soils

Composition: 10 percent
Landform: Alluvial fans and stream terraces

Braddock and similar soils

Composition: 5 percent
Landform: Undulating, old colluvial fans

Weverton and similar soils

Composition: 5 percent
Landform: Backslopes and footslopes on mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

TaC—Talladega channery silt loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Talladega and similar soils

Composition: 80 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from phyllite
Flooding: None
Water table: 6 feet or better
Available water capacity: Average of 3.8 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Trego and similar soils

Composition: 10 percent
Landform: Alluvial fans and old stream terraces

Braddock and similar soils

Composition: 5 percent
Landform: Undulating, old colluvial fans

Weverton and similar soils

Composition: 5 percent
Landform: Backslopes and footslopes on mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

TaD—Talladega channery silt loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Talladega and similar soils

Composition: 80 percent
Landform: Summits and backslopes
Slope: 15 to 25 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (paralithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from phyllite
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.8 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Thurmont and similar soils

Composition: 10 percent
Landform: Undulating, old colluvial fans and backslopes and footslopes on mountains

Weverton and similar soils

Composition: 10 percent
Landform: Backslopes and footslopes on mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Thurmont Series

The Thurmont series consists of very deep, well drained soils. Permeability is moderate. These soils formed in colluvium derived from quartzite on foot slopes, colluvial fans, and benches. Slopes range from 3 to 25 percent.

Thurmont soils are similar to Bagtown soils and commonly are mapped adjacent to Airmont, Braddock, Hazel, Talladega, Trego, and Weverton soils in adjacent, convex landscape positions. Bagtown soils are more than 60 inches deep over contrasting materials (residuum), have a seasonal high water table at a depth between 30 and 40 inches, and are higher on the landscape than Thurmont soils. Airmont and Trego soils both have a fragipan and have a seasonal high water table at a depth between 20 and 30 inches. Airmont soils average more than 35 percent rock fragments throughout. Braddock soils are in landscape positions similar to those of Thurmont soils, are more than 35 percent clay, and are much redder than Thurmont soils. Weverton soils have mixed colluvium derived from quartzite and phyllite over residuum derived from phyllite, average more than 35 percent rock fragments throughout, and are in higher landscape positions than Thurmont soils.

Typical pedon of Thurmont gravelly loam, 3 to 8 percent slopes, about 1,300 feet west of Chestnut Grove Road and 0.75 mile south of intersection of Mt. Briar and Chestnut Grove Roads; north of Chestnut Grove; lat. 39 degrees 25 minutes 26 seconds N. and long. 77 degrees 41 minutes 48 seconds W.

Oi—0 to 1 inch; partly decomposed leaf and twig matter.

Ap—1 to 5 inches; brown (10YR 4/3) gravelly loam; weak medium granular structure; very friable; many fine and medium roots; 30 percent gravel; strongly acid; clear smooth boundary.

BE—5 to 11 inches; light yellowish brown (10YR 6/4) gravelly loam; weak medium subangular blocky structure; very friable; many fine and medium and few coarse roots; few fine tubular pores; 30 percent gravel; strongly acid; clear smooth boundary.

Bt1—11 to 22 inches; strong brown (7.5YR 5/6) gravelly loam; weak medium subangular blocky structure; friable; common fine and medium and few coarse roots; common fine tubular and vesicular pores and few medium tubular pores; few faint discontinuous clay films on faces of peds; 25 percent gravel; very strongly acid; clear wavy boundary.

Bt2—22 to 33 inches; strong brown (7.5YR 5/6) and yellowish red (5YR 5/6) gravelly loam; moderate medium subangular blocky structure; friable; common fine and few medium roots; common fine tubular and vesicular pores and few medium tubular pores; many distinct discontinuous clay films on faces of peds and on rock fragments; 25 percent gravel; very strongly acid; clear wavy boundary.

Bt3—33 to 41 inches; strong brown (7.5YR 5/6) and reddish brown (5YR 5/4) gravelly clay loam; moderate medium subangular blocky structure; firm; few fine and medium roots; common fine tubular and vesicular pores and few medium vesicular pores; common distinct discontinuous clay films; 30 percent gravel; very strongly acid; clear wavy boundary.

2C1—41 to 60 inches; red (2.5YR 4/6) very gravelly sandy loam; massive; friable; many fine tubular and vesicular pores and common medium vesicular pores; common medium prominent yellowish brown (10YR 5/6) iron accumulations and common medium prominent light brownish gray (10YR 6/2) iron depletions; 50 percent gravel; very strongly acid; clear wavy boundary.

2C2—60 to 84 inches; red (2.5YR 4/6) very gravelly clay loam; weak thick platy structure; friable; few fine vesicular pores; many medium prominent yellowish brown (10YR 5/6) iron accumulations; common medium prominent light brownish gray (10YR 6/2) iron depletions; 50 percent channers; very strongly acid.

The solum ranges from 40 to 60 inches in thickness. Depth to hard bedrock is more than 60 inches. Depth to a lithologic discontinuity ranges from 40 to 60 inches. Fragments of gravel, cobbles, stones, and channers make up 5 to 30 percent of the solum and from 20 to 50 percent of the substratum. Redoximorphic features are common at a depth of about 36 inches. In unlimed areas reaction is strongly acid or very strongly acid.

The A horizon has hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 2 to 6. It is loam, sandy loam, or fine sandy loam.

The BE horizon has hue of 7.5YR to 10YR, value of 4 to 6, and chroma of 3 to 6. It is loam or sandy loam.

The Bt horizon has hue of 5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam.

The 2C horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 7. It is loam, sandy loam, or clay loam.

ThB—Thurmont gravelly loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Thurmont and similar soils

Composition: 85 percent
Landform: Undulating, old colluvial fans and backslopes and footslopes of mountains

Slope: 3 to 8 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Loamy colluvium derived from quartzite
Flooding: None
Water table: 4.0 to 6.0 feet
Available water capacity: Average of 6.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Braddock and similar soils

Composition: 5 percent
Landform: Undulating, old colluvial fans

Rohrersville and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Trego and similar soils

Composition: 5 percent
Landform: Alluvial fans and old stream terraces

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

ThC—Thurmont gravelly loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Thurmont and similar soils

Composition: 85 percent
Landform: Undulating old colluvial fans
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Loamy colluvium derived from quartzite
Flooding: None
Water table: 4.0 to 6.0 feet
Available water capacity: Average of 6.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Braddock and similar soils

Composition: 5 percent
Landform: Undulating, old colluvial fans

Rohrersville and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Trego and similar soils

Composition: 5 percent
Landform: Alluvial fans and old stream terraces

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

ThD—Thurmont gravelly loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Thurmont and similar soils

Composition: 85 percent
Landform: Undulating, old colluvial fans
Slope: 15 to 25 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Loamy colluvium derived from quartzite
Flooding: None
Water table: 4.0 to 6.0 feet
Available water capacity: Average of 6.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Braddock and similar soils

Composition: 10 percent
Landform: Undulating, old colluvial fans

Trego and similar soils

Composition: 3 percent
Landform: Alluvial fans and old stream terraces

Weverton and similar soils

Composition: 2 percent
Landform: Backslopes and footslopes of mountains

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Trego Series

The Trego series consists of very deep, moderately well drained soils on alluvial fans, old stream terraces, and concave footslopes along the west side of South Mountain and near Elk Ridge. These soils formed dominantly in acid, very old alluvium influenced by colluvium derived from crystalline and metamorphic rocks. Slopes range from 0 to 15 percent. Permeability is slow.

Trego soils are similar to Airmont soils and commonly are mapped adjacent to Bagtown, Braddock, Hazel, Talladega, Thurmont, and Weverton soils. Airmont soils are more than 35 percent rock fragments throughout the solum and are on higher, concave backslopes, generally near drainageways. Bagtown soils formed in deep colluvium, average less than 18 percent clay throughout, do not have a fragipan, and are on high, convex backslopes of mountains. Braddock soils are on convex uplands, are well drained, and average more than 35 percent clay throughout. Thurmount soils are well drained, do not have a fragipan, and are in higher landscape positions than Trego soils. Weverton soils are well drained, do not have a fragipan, average more than 35 percent rock fragments throughout, and have contrasting residuum derived from phyllite within a depth of 60 inches.

Typical pedon of Trego gravelly loam, 8 to 15 percent slopes, on abandoned cropland, 250 feet north of Black Rock Road and 0.5 mile west of intersection of Crystal Falls and Black Rock Roads; north of Mt. Lena; lat. 39 degrees 34 minutes 56 seconds N. and long. 77 degrees 37 minutes 6 seconds W.

Ap—0 to 9 inches; dark yellowish brown (10YR 3/4) gravelly loam; weak fine granular structure; friable; many fine and medium and few coarse roots; few fine tubular pores; 15 percent gravel; very strongly acid; clear smooth boundary.

BE—9 to 15 inches; brownish yellow (10YR 6/6) gravelly loam; weak medium subangular blocky structure; friable; common fine and medium and few coarse roots; many fine and few medium vesicular pores and common fine tubular pores; 5 percent cobbles and 20 percent gravel; strongly acid; clear wavy boundary.

Bt1—15 to 21 inches; brownish yellow (10YR 6/6) gravelly loam; moderate fine and medium subangular blocky structure; friable; common fine and medium and few coarse roots; common fine vesicular and tubular pores and few medium tubular pores; few faint discontinuous clay films on faces of peds; 15 percent gravel and 5 percent cobbles; strongly acid; abrupt wavy boundary.

Btx—21 to 38 inches; yellowish brown (10YR 5/4) gravelly sandy clay loam; weak coarse prismatic structure parting to moderate fine platy; firm; few fine roots confined to faces of prism; many fine, medium and coarse vesicular pores; many coarse distinct grayish brown (10YR 5/2) iron depletions; many coarse prominent strong brown (7.5YR 5/8) accumulated iron vertical streaks between faces of prism; common distinct discontinuous clay films on faces of peds and lining pores; common fine distinct light yellowish brown (2.5Y 6/4) silt coats on faces of prism; 1 percent cobbles and 25 percent gravel; moderately acid; clear irregular boundary.

BCt—38 to 64 inches; red (2.5YR 4/6) gravelly sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; common fine and medium vesicular pores and few fine tubular pores; common medium prominent light brownish gray (10YR 6/2) iron depletions in the upper part of the horizon; common coarse prominent brownish yellow (10YR 6/8) iron accumulations throughout; many distinct patchy clay films on rock fragments and in pores; 5 percent cobbles, 15 percent gravel; moderately acid.

BC—64 to 78 inches; strong brown (7.5YR 5/8) gravelly sandy loam; many coarse distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; few fine and medium vesicular pores; 15 percent gravel and 5 percent cobbles; moderately acid; gradual wavy boundary.

C—78 to 96 inches; reddish yellow (7.5YR 6/8) sandy loam; common medium distinct strong brown (7.5YR 5/8) mottles; massive; friable; few fine vesicular pores; 10 percent gravel; moderately acid.

The solum ranges from 40 to 70 inches in thickness. Bedrock is at a depth of more than 6 feet. The fragipan is at a depth of 20 to 30 inches. Fragments of gravel, cobbles, and stones range from 5 to 30 percent in the solum and from 10 to 40 percent in the substratum. Reaction ranges from very strongly acid to moderately acid unless the soils have been limed.

The A horizon has a hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 1 to 4. It is loam or silt loam.

The BE horizon has a hue of 7.5YR or 10YR, value of 4 to 6, and chroma 4 to 8. It is loam, fine sandy loam, sandy loam, or silt loam.

The Bt horizon has a hue of 2.5YR to 10YR, value 4 or 6, and chroma 4 to 8. It is loam, sandy clay loam, or clay loam.

The Btx horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Redoximorphic features are common. It is sandy loam, loam, or sandy clay loam.

The BC and BCt horizons, where they occur, have hue of 2.5YR to 7.5YR, value 4 or 6, and chroma of 4 to 8. It is loam, sandy loam, sandy clay loam, or loamy sand.

The C horizon has hue of 2.5YR to 10YR, value 5 or 6, and chroma 4 to 8. It is sandy loam, loam, sandy clay loam, or clay loam.

TrA—Trego gravelly loam, 0 to 3 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Trego and similar soils

Composition: 85 percent
Landform: Alluvial fans and old stream terraces
Slope: 0 to 3 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Fragipan at 20 to 30 inches
Drainage class: Moderately well drained
Parent material: Loamy colluvium derived from quartzite
Flooding: None
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 6.5 inches
Note: In some areas the hardpan is weakly expressed.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Braddock and similar soils

Composition: 10 percent
Landform: Undulating, old colluvial fans

Lantz and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

TrB—Trego gravelly loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Trego and similar soils

Composition: 85 percent
Landform: Alluvial fans and old stream terraces
Slope: 3 to 8 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Fragipan at a depth of 20 to 30 inches
Drainage class: Moderately well drained
Parent material: Loamy colluvium derived from quartzite
Flooding: None
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 6.5 inches
Note: In some areas the hard pan is weakly expressed.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Braddock and similar soils

Composition: 10 percent
Landform: Undulating, old colluvial fans

Rohrersville and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

TrC—Trego gravelly loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Valleys

Component Description

Trego and similar soils

Composition: 85 percent
Landform: Alluvial fans and old stream terraces
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly loam
Depth to a restrictive feature: Fragipan at a depth of 20 to 30 inches
Drainage class: Moderately well drained
Parent material: Loamy colluvium derived from quartzite
Flooding: None
Water table: 1.5 to 3.0 feet
Available water capacity: Average of 6.5 inches
Note: In some areas the hard pan is weakly expressed.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Braddock and similar soils

Composition: 5 percent
Landform: Undulating, old colluvial fans

Rohrersville and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Tyler Soils

The Tyler series consists of very deep, somewhat poorly drained soils. Permeability is slow or very slow. These soils formed in old alluvium eroded from acid shale and sandstone on uplands. They are in depressions on high terraces along streams. Slopes range from 0 to 8 percent.

Tyler soils are similar to Monongahela soils and commonly are mapped adjacent to Berks, Calvin, Klinesville, and Weikert soils. Monongahela soils are moderately well drained and have more sand throughout the solum than Tyler soils. Berks, Calvin, Klinesville, and Weikert soils formed in residuum derived from acid shale and are well drained and rapidly permeable.

Typical pedon of Tyler silt loam, 0 to 3 percent slopes, in a pine plantation, along Licking Creek, about 650 feet south of intersection of Corner and Park Head Roads and 1,500 feet east of Park Head Road; north of Park Head; lat. 39 degrees 41 minutes 6 seconds N. and long. 78 degrees 3 minutes 29 seconds W.

Oi—0 to 0.5 inch; pine needles and twigs.

A—0.5 to 4 inches; olive brown (2.5Y 4/3) silt loam; weak medium subangular blocky structure parting to weak fine granular; very friable; many fine and common medium roots; strongly acid; clear smooth boundary.

Ap—4 to 10 inches; light olive brown (2.5Y 5/3) silt loam; moderate medium subangular blocky structure; friable; many fine and common medium roots; many fine and common medium tubular pores and few medium vesicular pores; 1 percent rock fragments; moderately acid; abrupt smooth boundary.

BE—10 to 16 inches; light yellowish brown (2.5Y 6/4) silt loam; weak coarse subangular blocky structure parting to moderate medium platy; friable; many fine and common medium roots; many fine tubular and vesicular pores, common medium tubular pores, and few medium vesicular pores; many fine and medium prominent strong brown (7.5YR 4/6) iron accumulations; strongly acid; clear smooth boundary.

Btg1—16 to 27 inches; grayish brown (2.5Y 5/2) silty clay loam; strong medium subangular blocky structure; firm; common medium and few fine roots; many fine vesicular pores, few fine tubular pores, and common medium vesicular pores; many medium distinct prominent strong brown (7.5YR 5/8) iron accumulations; many coarse distinct light brownish gray (10YR 6/2) iron depletions; common patchy clay films on faces of peds and lining pores; 5 percent gravel; very strongly acid; clear wavy boundary.

Btg2—27 to 38 inches; grayish brown (10YR 5/2) silty clay; common fine and medium strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to strong fine subangular blocky; firm; common fine and medium roots along faces of peds; few fine tubular pores; many medium distinct strong brown (7.5YR 5/8) iron accumulations; many coarse distinct pale brown (10YR 6/3) iron depletions; common distinct patchy clay films on faces of peds and lining pores; 5 percent gravel; very strongly acid; clear irregular boundary.

Btxg—38 to 55 inches; light olive gray (5Y 6/2) clay loam; weak coarse prismatic structure parting to moderate thin platy; prism streaks are about 6 inches apart and one eighth inch wide; few fine roots on faces of peds; many fine and common medium vesicular pores and few fine tubular pores; common medium distinct yellowish red (5YR 5/8) iron accumulations; common medium prominent strong brown (7.5YR 5/8) iron accumulations; common coarse prominent gray (10YR 5/1) clay films on faces of peds; 10 percent gravel; extremely acid.

The solum ranges from 40 to 60 inches in thickness. Bedrock is at a depth of more than 60 inches. Rock fragments range from 0 to 5 percent above the fragipan, from 0 to 15 percent in the fragipan, and from 0 to 15 percent in the substratum. In unlimed areas reaction is strongly acid to extremely acid.

The A or Ap horizon has a hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 3. It is silt loam. The A horizon is strongly acid to extremely acid, but the Ap horizon ranges to slightly acid.

The BE horizon has hue of 10YR to 2.5Y, value of 5 to 6, and chroma of 1 or 4. It is silt loam in the fine earth fraction. Reaction is very strongly acid or extremely acid.

The Btg horizon has hue of 10YR or 2.5Y, value of 5 to 6, and chroma of 1 or 2. It is dominantly silt loam or silty clay loam in the fine earth fraction. Reaction is very strongly acid or extremely acid.

The Btxg horizon has hue of 10YR to 5Y, chroma of 2 to 6, and value of 4 to 6. It is silt loam, silty clay loam, or clay loam in the fine earth fraction. It is very strongly acid or extremely acid.

The C horizon is neutral or has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 2 to 6. It is stratified silty clay loam, silt loam, loam, or sandy loam in the fine earth fraction. Reaction is strongly acid or very strongly acid.

TyA—Tyler silt loam, 0 to 3 percent slopes

Map Unit Setting

Landscape: River valleys

Component Description

Tyler and similar soils

Composition: 85 percent
Landform: Stream terraces
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Fragipan at a depth of 30 to 40 inches
Drainage class: Somewhat poorly drained
Parent material: Silty old alluvium derived from shale and siltstone
Flooding: None
Water table: 0.5 to 2.0 feet
Available water capacity: Average of 6.9 inches

A typical soil description is included in this section (see “Index to Series”). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see “Summary of Tables”).

Additional Components

Monongahela and similar soils

Composition: 10 percent
Landform: Stream terraces

Unnamed soils

Composition: 5 percent
Landform: Depressions

Management

For general and detailed information about managing this map unit, see the section “Use and Management of the Soils.”

TyB—Tyler silt loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: River valleys

Component Description

Tyler and similar soils

Composition: 85 percent
Landform: Stream terraces
Slope: 3 to 8 percent
Texture of the surface layer: Silt loam

Depth to a restrictive feature: Fragipan at a depth of 30 to 40 inches
Drainage class: Somewhat poorly drained
Parent material: Silty old alluvium derived from shale and siltstone
Flooding: None
Water table: 0.5 to 2.0 feet
Available water capacity: Average of 6.9 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Monongahela and similar soils

Composition: 10 percent
Landform: Stream terraces

Unnamed soils

Composition: 5 percent
Landform: Depressions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Ud—Udorthents, smooth

Map Unit Setting

Note: This unit is highly variable. It is in such areas as landfills and old railroad beds.

Component Description

Udorthents

Composition: 100 percent
Landform: Summits and backslopes

Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

UrB—Urban land, 0 to 8 percent slopes

Component Description

Urban land and similar soils

Composition: 55 percent
Landform: Man influenced
Slope: 0 to 8 percent
Texture of the surface layer: Concrete and asphalt
Depth to a restrictive feature: Concrete surface
Parent material: Man influenced
Flooding: None
Water table: Variable
Available water capacity: None assigned

Hagerstown and similar soils

Composition: 30 percent
Landform: Upland flats
Slope: 3 to 8 percent
Texture of the surface layer: Silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 60 to 80 inches
Drainage class: Well drained
Parent material: Clayey residuum derived from limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 10.3 inches

Additional Components

Opequon and similar soils

Composition: 10 percent
Landform: Summits and backslopes

Funkstown and similar soils

Composition: 5 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

UrD—Urban land, 8 to 25 percent slopes

Component Description

Urban Land and similar soils

Composition: 55 percent
Landform: Man influenced
Slope: 8 to 25 percent
Texture of the surface layer: Concrete and asphalt

Depth to a restrictive feature: Concrete surface
Parent material: Man influenced
Flooding: None
Water table: Variable
Available water capacity: None assigned

Walkersville Series

The Walkersville series consists of very deep, well drained soils. Permeability is moderate. These soils formed in old alluvium over residuum derived from limestone. They are on old river terraces along the Antietam River, 10 to 40 feet above the active flood plain. Slopes range from 0 to 25 percent.

Walkersville soils are similar to Downsville soils and commonly are mapped adjacent to Duffield, Hagerstown, Opequon, Nollville, and Ryder soils. Downsville soils have more than 35 percent rock fragments throughout and are near the larger rivers. Duffield, Hagerstown, and Nollville soils formed in residuum derived from limestone. They do not have rounded gravel or sand in the solum. Ryder and Opequon soils are shallower to bedrock than Walkersville soils.

Typical pedon of Walkersville gravelly loam, 8 to 15 percent slopes, on northwest-facing, convex, cropland, 3,000 feet northeast of Leitersburg, 1,250 feet northwest of MD-60; near Leitersburg; lat. 39 degrees 42 minutes 6 seconds N. and long. 77 degrees 37 minutes 19 seconds W.

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) gravelly loam; moderate fine granular structure; friable; common fine and medium roots; common fine and medium tubular and vesicular pores; 20 percent gravel; neutral; abrupt smooth boundary.

BE—10 to 18 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable; common fine roots; many fine vesicular and tubular pores; few faint discontinuous clay films on faces of peds and lining pores; 5 percent gravel; neutral; clear wavy boundary.

Bt1—18 to 61 inches; yellowish red (5YR 5/6); clay loam; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many fine tubular and vesicular pores; common distinct continuous clay films lining pores and on faces of peds; 5 percent gravel; moderately acid; gradual wavy boundary.

Bt2—61 to 72 inches; yellowish red (5YR 5/8) clay; common medium prominent yellowish brown (10YR 5/4) mottles; weak coarse prismatic structure parting to moderate coarse and medium subangular blocky; firm; few fine roots; many fine vesicular and common fine tubular pores; common distinct continuous clay films in pores and on faces of peds; 10 percent gravel; moderately acid.

The solum ranges from 60 to 80 inches in thickness. Depth to lithologic discontinuity is 30 to 80 inches or more. Lithic contact is at a depth of more than 60 inches. Content of rock fragments, which are rounded, ranges from 5 to 35 percent in the solum. Reaction ranges from neutral to moderately acid throughout.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 3 to 6. It is silt loam or loam.

The BE horizon has hue of 10YR or 7.5YR, value 4 to 6, and chroma 4 to 8. It is silt loam or loam.

The Bt horizon has hue of 5YR to 7.5YR, value 4 to 6, and chroma 4 to 8. It is silt loam, loam, clay loam, clay, sandy clay, or silty clay loam.

WaA—Walkersville silt loam, 0 to 3 percent slopes

Map Unit Setting

Landscape: River valleys

Component Description

Walkersville and similar soils

Composition: 85 percent
Landform: Stream terraces
Slope: 0 to 3 percent
Texture of the surface layer: Silt loam
Drainage class: Well drained
Parent material: Loamy old alluvium derived from quartzite or from limestone, sandstone, and shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Swanpond and similar soils

Composition: 10 percent
Landform: Saddles and swales

Opequon and similar soils

Composition: 4 percent
Landform: Summits and backslopes

Unnamed soils

Composition: 1 percent

Landform: Depressions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WaB—Walkersville silt loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: River valleys

Component Description

Walkersville and similar soils

Composition: 85 percent
Landform: Stream terraces
Slope: 3 to 8 percent
Texture of the surface layer: Silt loam
Drainage class: Well drained
Parent material: Loamy old alluvium derived from quartzite or from limestone, sandstone, and shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.8 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Swanpond and similar soils

Composition: 10 percent
Landform: Saddles and swales

Opequon and similar soils

Composition: 4 percent
Landform: Summits and backslopes

Unnamed soils

Composition: 1 percent
Landform: Depressions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WaC—Walkersville silt loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: River valleys

Component Description

Walkersville and similar soils

Composition: 90 percent
Landform: Stream terraces
Slope: 8 to 15 percent
Texture of the surface layer: Silt loam
Drainage class: Well drained
Parent material: Loamy, old colluvium derived from limestone, sandstone, and shale or loamy old alluvium derived from quartzite
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.8 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Opequon and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Swanpond and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WcA—Walkersville gravelly loam, 0 to 3 percent slopes

Map Unit Setting

Landscape: River valleys

Component Description

Walkersville and similar soils

Composition: 85 percent
Landform: Stream terraces
Slope: 0 to 3 percent

Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Loamy old colluvium derived from limestone, sandstone, and shale or loamy old alluvium derived from quartzite
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Swanpond and similar soils

Composition: 9 percent
Landform: Saddles and swales

Opequon and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Unnamed soils

Composition: 1 percent
Landform: Depressions

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WcB—Walkersville gravelly loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: River valleys

Component Description

Walkersville and similar soils

Composition: 85 percent
Landform: Stream terraces
Slope: 3 to 8 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Loamy, old alluvium derived from quartzite and loamy, old colluvium derived from limestone, sandstone, and shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Swanpond and similar soils

Composition: 10 percent
Landform: Saddles and swales

Opequon and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WcC—Walkersville gravelly loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: River valleys

Component Description

Walkersville and similar soils

Composition: 90 percent
Landform: Stream terraces
Slope: 8 to 15 percent
Texture of the surface layer: Gravelly loam
Drainage class: Well drained
Parent material: Loamy old alluvium derived from quartzite or loamy old colluvium derived from limestone, sandstone, and shale
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.1 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Opequon and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Swanpond and similar soils

Composition: 5 percent

Landform: Saddles and swales

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Weikert Series

The Weikert series consists of shallow, well drained soils. Permeability is moderate or moderately rapid. These soils formed in residuum derived from olive yellow acid shale. They are on side slopes of highly dissected shale ridges. Slopes range from 3 to 65 percent.

Weikert soils are similar to Klinesville soils and commonly are mapped adjacent to Andover, Berks, Brinkerton, Buchanan, Calvin, Clearbrook, and Sideling soils. Klinesville soils have a redder solum than Weikert soils and formed in acid, red shale and fine grained sandstone. Berks and Calvin soils are on summits of shale ridges, have a thicker solum than Weikert soils, and are moderately deep to shale bedrock. Andover and Brinkerton soils are in concave draws on uplands, are poorly drained, and are slowly permeable because of a fragipan. Clearbrook soils are on flats and in concave draws on uplands, are moderately well drained, and have slow permeability. Buchanan and Sideling soils formed in colluvium derived from sandstone over residuum derived from shale. They are moderately well drained.

Typical pedon of Weikert very channery silt loam, 15 to 25 percent slopes, in a west-facing, convex oak-hickory forest, 1,200 feet north of Long Ridge Church, 150 feet east of Long Ridge Road; near Exline; lat. 39 degrees 40 minutes 28 seconds N. and long. 78 degrees 16 minutes 31 seconds W.

Oi/A— 0 to 2 inches; very dark grayish brown (10YR 3/2) very channery silt loam; weak fine granular structure; very friable; many very fine and fine and common medium roots; 35 percent angular shale channers; very strongly acid; clear wavy boundary.

Bw1—2 to 9 inches; brown (10YR 5/3) very channery silt loam; weak fine and medium subangular blocky structure; very friable; many very fine and fine and common medium roots; many fine vesicular and common medium tubular pores; 35 percent angular shale channers; very strongly acid; clear wavy boundary.

Bw2—9 to 15 inches; brownish yellow (10YR 6/6) very channery silt loam; moderate fine subangular blocky structure; very friable; many fine and common medium roots; common fine tubular pores; few distinct patchy strong brown (7.5YR 5/6) clay films on faces of peds and in pores; 40 percent angular shale channers and 1 percent angular flagstones; strongly acid; clear wavy boundary.

C—15 to 18 inches; brownish yellow (10YR 6/6) extremely channery silt loam; massive; very friable; common fine and medium roots; common fine and medium voids between rock fragments; few distinct patchy strong brown (7.5YR 5/6) clay films on rock fragments; 80 percent angular shale channers; very strongly acid; abrupt irregular boundary.

R—18 to 60 inches; olive yellow (2.5Y 6/6) silt loam; in highly fractured, strongly cemented shale; common fine roots in cracks; 30 percent voids; strongly acid.

The solum ranges from 10 to 20 inches in thickness. Bedrock is at a depth of 15 to 20 inches. Rock fragments range from 15 to 45 percent in the surface layer, from 35 to 60 in the solum, and from 60 to 80 percent in the substratum. Bedrock is olive yellow shale that is highly fractured.

The A horizon has hue of 10YR to 7.5YR, value of 3 or 5, and chroma of 2 to 4. It is silt loam or loam.

The Bw horizon has hue of 10YR to 7.5YR, value of 4 to 6, and chroma of 3 to 6. It is silt loam or loam.

The C horizon has hue of 2.5Y to 7.5YR, value of 4 or 6, and chroma of 3 to 8. It is silt loam or loam.

WeB—Weikert very channery silt loam, 3 to 8 percent slopes

Map Unit Setting

Landscape: Mountains and valleys

Component Description

Weikert and similar soils

Composition: 85 percent
Landform: Ridges
Slope: 3 to 8 percent
Texture of the surface layer: Very channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None

Water table: 6 feet or more
Available water capacity: Average of 1.1 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Brinkerton and similar soils

Composition: 5 percent
Landform: Drainageways

Clearbrook and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Klinesville and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WeC—Weikert very channery silt loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Mountains and valleys

Component Description

Weikert and similar soils

Composition: 85 percent
Landform: Ridges
Slope: 8 to 15 percent
Texture of the surface layer: Very channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 1.1 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Brinkerton and similar soils

Composition: 5 percent
Landform: Drainageways

Clearbrook and similar soils

Composition: 5 percent
Landform: Swales, depressions, and drainageways

Klinesville and similar soils

Composition: 5 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WeD—Weikert very channery silt loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: Mountains and valleys

Component Description

Weikert and similar soils

Composition: 85 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Very channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 1.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Clearbrook and similar soils

Composition: 10 percent
Landform: Swales, depressions, and drainageways

Klinesville and similar soils

Composition: 5 percent

Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WeF—Weikert very channery loam, 25 to 65 percent slopes

Map Unit Setting

Landscape: Mountains and valleys

Component Description

Weikert and similar soils

Composition: 85 percent
Landform: Ridges
Slope: 25 to 65 percent
Texture of the surface layer: Very channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 1.0 inch

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Unnamed very shallow soils

Composition: 10 percent
Landform: None assigned

Klinesville and similar soils

Composition: 5 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WkB—Weikert-Berks channery silt loams, 3 to 8 percent slopes

Map Unit Setting

Landscape: Mountains and valleys

Component Description

Weikert and similar soils

Composition: 40 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 1.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Berks and similar soils

Composition: 40 percent
Landform: Summits and backslopes
Slope: 3 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Brinkerton and similar soils

Composition: 10 percent
Landform: Drainageways

Clearbrook and similar soils

Composition: 5 percent

Landform: Swales, depressions, and drainageways

Klinesville and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WkC—Weikert-Berks channery silt loams, 8 to 15 percent slopes

Map Unit Setting

Landscape: Mountains and valleys

Component Description

Weikert and similar soils

Composition: 50 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 1.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Berks and similar soils

Composition: 40 percent
Landform: Summits and backslopes
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.3 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Klinesville and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Brinkerton and similar soils

Composition: 3 percent
Landform: Drainageways

Clearbrook and similar soils

Composition: 2 percent
Landform: Swales, depressions, and drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WkD—Weikert-Berks channery silt loams, 15 to 25 percent slopes

Map Unit Setting

Landscape: Valleys and mountains

Component Description

Weikert and similar soils

Composition: 50 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 10 to 20 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 1.1 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Berks and similar soils

Composition: 35 percent
Landform: Ridges
Slope: 15 to 25 percent

Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shale and siltstone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.2 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Unnamed very shallow soils

Composition: 10 percent
Landform: None assigned

Clearbrook and similar soils

Composition: 3 percent
Landform: Swales, depressions, and drainageways

Klinesville and similar soils

Composition: 2 percent
Landform: Ridges

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Weverton Series

The Weverton series consists of deep, well drained soils. Permeability is moderate. These soils formed in colluvium derived from interbedded quartzite and quartz over residuum derived from muscovite schist and phyllite. They are on convex backslopes of South Mountain and Elk Ridge. Slopes range from 8 to 45 percent.

Weverton soils are similar to Bagtown soils and commonly are mapped adjacent to Airmont, Braddock, Thurmont, Trego, and Dekalb soils. Airmont soils are on concave landscapes, have a fragipan, and are slowly permeable. Bagtown soils formed in deeper deposits of colluvium than Weverton soils, are moderately well drained, and have slower permeability. Dekalb soils are on ridgetops and shoulders above Weverton soils and are moderately deep to bedrock. Trego soils are on lower concave landscapes, have a fragipan, and are moderately well drained. Thurmont soils are in lower, convex, colluvial positions and have fewer rock fragments in the solum than Weverton soils.

Typical pedon of Weverton very flaggy loam, 8 to 15 percent slopes, about 200 feet south of intersection of MD-67 and Main Street in Brownsville, about 1,100 feet east of Main Street; lat. 39 degrees 22 minutes 51 seconds N. and long. 77 degrees 39 minutes 13 seconds W.

Oi—0 to 4 inches; partly decomposed leaf and twig matter; 20 percent flagstones.

A—4 to 8 inches; black (10YR 3/1) very flaggy loam; weak fine granular structure; very friable; many fine roots; 20 percent flagstones, 15 percent cobbles, and 5 percent gravel; extremely acid; gradual wavy boundary.

E—8 to 13 inches; yellowish brown (10YR 5/6) extremely gravelly loam; weak medium subangular blocky structure; many fine and medium roots; common fine tubular pores; 65 percent gravel, 10 percent flagstones, and 5 percent cobbles; very strongly acid; clear wavy boundary.

Bt1—13 to 20 inches; brownish yellow (10YR 6/6) extremely gravelly loam; moderate medium subangular blocky structure; friable; common fine and coarse and many medium and few coarse roots; many fine tubular and common fine vesicular pores; common faint discontinuous yellowish brown (10YR 5/6) clay films on faces of peds and in pores; 50 percent gravel and 10 percent channers; strongly acid; clear wavy boundary.

Bt2—20 to 35 inches; yellowish brown (10YR 5/6) very gravelly loam; moderate medium subangular blocky structure; friable; many medium and common fine and coarse roots; many fine tubular pores, common fine vesicular pores, and common medium tubular pores; many distinct patchy strong brown (7.5YR 5/6) clay films on faces of peds and in pores; 25 percent gravel and 15 percent channers; very strongly acid; clear smooth boundary.

2Bt3—35 to 48 inches; strong brown (7.5YR 5/6) very channery loam; common fine and medium distinct yellowish brown (10YR 5/6) mottles between peds and common fine prominent light yellowish brown (2.5Y 6/4) mottles in cracks; moderate medium subangular blocky structure; friable; many fine and medium and common coarse roots; common medium tubular pores and many fine vesicular pores; prominent discontinuous strong brown (7.5YR 4/6) clay films on faces of peds and in pores; 25 percent schist channers and 10 percent gravel; strongly acid; clear wavy boundary.

2C—48 to 57 inches; yellowish red (5YR 5/8) and strong brown (7.5YR 5/6) loam; common medium prominent light yellowish brown (2.5Y 6/4) mottles; weak fine platy structure parting to massive; firm; common fine and medium roots; common fine tubular pores and common medium and many fine vesicular pores; 10 percent channers; strongly acid; abrupt smooth boundary.

R—57 to 77 inches; extremely hard phyllite and schist bedrock; 20 percent strong brown (7.5YR 5/8) loam in voids; common medium roots in fractures.

The solum ranges from 30 to 50 inches in thickness. Hard bedrock is at a depth of more than 60 inches. Soft bedrock is at a depth of more than 50 inches. Rock fragments range from 25 to 60 percent throughout. Surface stones cover as much as 15 percent. Reaction is strongly acid or very strongly acid.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 1 to 3. It is sandy loam or loam.

The E horizon, where it occurs, has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 6. It is sandy loam or loam.

The Bt horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 4 to 8. It is sandy loam, sandy clay loam, or loam.

The 2C horizon has hue of 5YR to 10YR, chroma of 5 or 6, and value of 5 to 8. It is loam, sandy loam, or silt loam.

WrC—Weverton very flaggy loam, 8 to 15 percent slopes

Map Unit Setting

Landscape: Mountains

Component Description

Weverton and similar soils

Composition: 80 percent
Landform: Backslopes and footslopes on mountains
Slope: 8 to 15 percent
Texture of the surface layer: Very flaggy loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 40 to 60 inches
Drainage class: Well drained
Parent material: Gravelly colluvium derived from phyllite or quartzite or gravelly residuum derived from phyllite
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.7 inches
Note: In some areas the subsoil is less than 35 percent rock fragments. Also, in some areas the surface is stony.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Airmont and similar soils

Composition: 10 percent
Landform: Head slopes, footslopes, and drainageways on mountains

Talladega and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Unnamed soils

Composition: 5 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WrD—Weverton very flaggy loam, 15 to 25 percent slopes

Map Unit Setting

Landscape: Mountains

Component Description

Weverton and similar soils

Composition: 85 percent
Landform: Backslopes and footslopes on mountains
Slope: 15 to 25 percent
Texture of the surface layer: Very flaggy loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 40 to 60 inches
Drainage class: Well drained
Parent material: Gravelly colluvium derived from quartzite or from phyllite or gravelly residuum derived from phyllite
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.7 inches
Note: In some areas the subsoil is less than 35 percent rock fragments. Also, in some areas the surface is stony.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Airmont and similar soils

Composition: 9 percent
Landform: Head slopes, footslopes, and drainageways on mountains

Talladega and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Unnamed soils

Composition: 1 percent
Landform: Drainageways

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WrE—Weverton very flaggy loam, 25 to 45 percent slopes

Map Unit Setting

Landscape: Mountains

Component Description

Weverton and similar soils

Composition: 85 percent
Landform: Backslopes and footslopes of mountains
Slope: 25 to 45 percent
Texture of the surface layer: Very flaggy loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 40 to 60 inches
Drainage class: Well drained
Parent material: Gravelly colluvium derived from phyllite or from quartzite or gravelly residuum derived from phyllite
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.7 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Airmont and similar soils

Composition: 10 percent
Landform: Head slopes, footslopes, and drainageways on mountains

Talladega and similar soils

Composition: 5 percent
Landform: Summits and backslopes

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Wurno Series

The Wurno series consists of moderately deep, well drained soils. Permeability is moderate. These soils formed in residuum derived from calcareous shale and interbedded layers of limestone. They are on dissected ridges on uplands in the western part of Washington County. Slopes range from 3 to 45 percent.

Wurno soils are similar to Ryder soils and commonly are mapped adjacent to Berks, Calvin, Hagerstown, Klinesville, Nollville, Pecktonville, and Weikert soils. Ryder soils formed in residuum derived from shaly limestone and have fewer rock fragments in the solum than Wurno soils. Calvin and Klinesville soil formed in residuum derived from acid, red sandstone and shale. Berks and Weikert soils formed in acid, gray brown shale. Hagerstown soils formed in dolomitic limestone, are less than 35 percent rock fragments throughout, and average more than 35 percent clay. Nollville soils formed in residuum derived from shaly limestone, have fewer rock fragments in the solum than Wurno soils, and are deep to bedrock. Pecktonville soils formed in residuum derived from cherty limestone, are very deep, and have a seasonally high water table below a depth of 40 inches.

Typical pedon of Wurno channery silt loam, in an area of Wurno-Nollville channery silt loams, 25 to 45 percent slopes, in a west-facing, convex orchard, 1,200 feet west of I-70 and 900 feet south of the Mason-Dixon Line; near Hancock, on the Mallot quarry property; lat. 39 degrees 43 minutes 41 seconds N. and long. 78 degrees 11 minutes 30 seconds W.

Ap—0 to 4 inches; brown (10YR 5/3) channery silt loam; strong medium granular structure; friable; many fine and medium roots; 15 percent calcareous shale channers; slightly acid; abrupt smooth boundary.

Bw1—4 to 11 inches; brownish yellow (10YR 6/6) channery silt loam; common fine faint brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; friable; common fine roots; many fine and medium tubular and vesicular pores; few distinct clay skins on faces of peds; 30 percent calcareous shale channers; slightly acid; clear wavy boundary.

Bw2—11 to 31 inches; strong brown (7.5YR 5/8) very channery silty clay loam; common coarse distinct brownish yellow (10YR 6/8) lithochromic mottles; moderate medium subangular blocky structure; firm; common fine and few medium roots; many fine and common medium tubular and vesicular pores; common fine prominent black (5YR 2.5/1) manganese stains on coarse fragments; few distinct patchy clay films on faces of peds and lining pores; 40 percent calcareous shale channers; slightly acid; abrupt irregular boundary.

R—31 to 60 inches; grayish brown (10YR 5/2) and olive brown (2.5Y 4/4) strongly cemented calcareous shale; slight effervescence; common fine and few medium roots confined to fracture planes in saprolite; slightly alkaline.

The solum ranges from 10 to 30 inches in thickness. Saprolite is at a depth of 20 to 40 inches. Rock fragments of calcareous shale range from 5 to 65 percent throughout. A discontinuous argillic horizon is in some part of the pedon. In unlimed areas reaction is moderately acid or slightly acid.

The Ap and A horizon has hue of 7.5YR to 10YR, value 3 or 5, and chroma 2 to 4. It is silt loam or loam.

The Bw horizon has hue of 7.5YR to 10YR, value 4 to 6, and chroma 4 to 8. It is silt loam, loam, clay loam, or silty clay loam.

The C horizon, where it occurs, has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma 4 to 8. It is strongly weathered, multicolored, calcareous shale. It is loam or silt loam. The rock fragments crush easily under moderate pressure to silt loam.

The Cr horizon is multicolored and has lithochromic colors. Large fractures and voids are between highly weathered rocks. These cracks are filled with fine earth material similar to that in the C horizon. Some rocks are calcareous and slightly effervescent.

WuB—Wurno-Nollville channery silt loams, 3 to 8 percent slopes

Map Unit Setting

Landscape: Uplands

Component Description

Wurno and similar soils

Composition: 50 percent
Landform: Summits and backslopes; ridges
Slope: 3 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 4.5 inches
Note: Bedrock is at a depth of less than 10 inches on eroded summits and shoulders.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Nollville and similar soils

Composition: 40 percent
Landform: Summits and backslopes; ridges
Slope: 3 to 8 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 40 to 60 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Swanpond and similar soils

Composition: 10 percent
Landform: Saddles and swales

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WuC—Wurno-Nollville channery silt loams, 8 to 15 percent slopes

Map Unit Setting

Landscape: Uplands

Component Description

Wurno and similar soils

Composition: 60 percent
Landform: Summits and backslopes; ridges
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 3.5 inches
Note: Bedrock is at a depth of less than 10 inches on eroded summits and shoulders.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Nollville and similar soils

Composition: 40 percent
Landform: Summits and backslopes; ridges
Slope: 8 to 15 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 40 to 60 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WuD—Wurno-Nollville channery silt loams, 15 to 25 percent slopes

Map Unit Setting

Landscape: Uplands

Component Description

Wurno and similar soils

Composition: 50 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.5 inches
Note: Bedrock is at a depth of less than 10 inches on some eroded shoulders and convex backslopes.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Nollville and similar soils

Composition: 40 percent
Landform: Ridges
Slope: 15 to 25 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 40 to 60 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Unnamed shallow soils

Composition: 10 percent
Landform: None assigned

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WuE—Wurno-Nollville channery silt loams, 25 to 45 percent slopes

Map Unit Setting

Landscape: Uplands

Component Description

Wurno and similar soils

Composition: 50 percent
Landform: Ridges
Slope: 25 to 45 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 20 to 40 inches
Drainage class: Well drained
Parent material: Gravelly residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 2.3 inches
Note: Bedrock is at a depth of less than 10 inches on eroded shoulders and convex backslopes.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Nollville and similar soils

Composition: 35 percent
Landform: Ridges
Slope: 25 to 45 percent
Texture of the surface layer: Channery silt loam
Depth to a restrictive feature: Bedrock (lithic) at a depth of 40 to 60 inches
Drainage class: Well drained
Parent material: Loamy residuum derived from shaly limestone
Flooding: None
Water table: 6 feet or more
Available water capacity: Average of 8.0 inches

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

Additional Components

Unnamed shallow soils

Composition: 15 percent
Landform: None assigned

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; for agricultural waste management; and as wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, slightly limited, somewhat limited,* and *very limited.* The suitability ratings are expressed as *well suited, moderately well suited, poorly suited,* and *unsuited* or as *good, fair,* and *poor.*

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Cropland Limitations and Hazards

The management concerns affecting the use of the detailed soil map units in the survey for crops are shown in table 8, "Main Limitations and Hazards on Cropland." The main concerns in managing nonirrigated cropland are conserving moisture, controlling soil blowing and water erosion, and maintaining soil fertility. The limitations and hazards listed in this table apply only to the crops shown in the tables 9a and 9b, "Land Capability and Yields per Acre of Crops and Pasture."

Conserving moisture consists primarily of reducing the evaporation and runoff rates and increasing the water intake rate. Applying conservation tillage and conservation cropping systems, farming on the contour, stripcropping, establishing field windbreaks, and leaving crop residue on the surface conserve moisture.

Generally, a combination of several practices is needed to control *soil blowing* and *water erosion*. Conservation tillage, stripcropping, field windbreaks, tall grass barriers, contour farming, conservation cropping systems, crop residue management, diversions, and grassed waterways help to prevent excessive soil loss.

Measures that are effective in maintaining *soil fertility* include applying fertilizer, both organic and inorganic, including manure; incorporating crop residue or green manure crops into the soil; and using proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and thus helps to maintain productivity, although the level of fertility can be reduced even in areas where erosion is controlled. All soils used for nonirrigated crops respond well to applications of fertilizer.

Some of the limitations and hazards shown in the table cannot be easily overcome. These are *channels, flooding, depth to rock, ponding,* and *gullies.*

Additional limitations and hazards are as follows:

Acidity—Soil pH too low for optimum growth of plants.

Nonsoil material—Areas that do not have a suitable medium for growing plants.

Areas of rock outcrop—Farming around these areas may be feasible.

Excessive permeability—This limitation causes deep leaching of nutrients and pesticides. The capacity of the soil to retain moisture for plant use is poor.

Potential for ground water pollution—This is a hazard in soils that have excessive permeability, hard bedrock, sinkholes, or a water table within the profile (fig. 20).

Limited available water capacity, poor tilth, restricted permeability, and *surface crusting*—These limitations can be overcome by incorporating green manure crops, manure, or crop residue into the soil; applying a system of conservation tillage; and using conservation dropping systems.

Surface coarse fragments—This limitation causes rapid wear of tillage equipment. It cannot be easily overcome.

Slope—Where the slope is more than 8 percent, water erosion and soil blowing may be accelerated unless conservation farming practices are applied.

Surface stones—Stones or boulders on the surface can hinder normal tillage unless they are removed.

Following is an explanation of the criteria used to determine the limitations or hazards.

Areas of rock outcrop—Rock outcrop is a named component of the map unit.

Depth to rock—Bedrock is within a depth of 40 inches.

Erosion by water—The surface K factor multiplied by the upper slope limit is more than 2 (same as prime farmland criteria).

Flooding—The component of the map unit is occasionally flooded or frequently flooded.

Limited available water capacity—The available water capacity calculated to a depth of 60 inches or to a root-limiting layer is 5 inches or less.

Ponding—Ponding duration is assigned to the component of the map unit.

Potential for ground water pollution—The soil has a water table within a depth of 4 feet or hard bedrock within the profile, or permeability is more than 6 inches per hour within the soil or sinkholes.

Poor tilth—The component of the map unit has more than 35 percent clay in the surface layer.

Resricted permeability—Permeability is 0.06 inches per hour or less within the soil profile.

Slope—The upper slope range of the component of the map unit is more than 8 percent.

Soil blowing—The wind readability index multiplied by the selected high C factor for the survey area and then divided by the T factor is more than 8 for the component of the map unit.

Surface rock fragments—The terms describing the texture of the surface layer include any rock fragment modifier except for gravelly or channery, and "surface stones" is not already indicated as a limitation.

Surface stones—The terms describing the texture of the surface layer include any stony or bouldery modifier, or the soil is a stony or bouldery phase.

Water table—The component of the map unit has a water table within a depth of 60 inches.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management

Figure 20.—Runoff flowing on Funkstown silt loam into a sinkhole. Ground water contamination is a major management concern on karst landscapes.

are shown in tables 9a and 9b. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in tables 9a and 9b are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops (USDA, SCS, 1961). Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forestland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 to 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, forestland, wildlife habitat, or recreation.

The capability classification of map units in this survey area is given in tables 9a and 9b, "Land Capability and Yields per Acre of Crops and Pasture."

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 10. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 10. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Forest Productivity and Management

Andy Smoger, project forester, Maryland Department of Natural Resources, helped to prepare this section.

When Washington County was settled in the 1700's, practically all its area was forested. The predominant species were deciduous, but conifers, such as white pine, Virginia pine, hemlock, and eastern redcedar, made up a small percentage of forest cover. As settlement advanced and agricultural use of the land became more common, forestland declined, particularly on the fertile soils of the Hagerstown Valley. In the late 1800's and early 1900's, factors such as improved transportation, advances in agriculture, forest fires, logging, and the Civil War influenced the composition and quantity of forestland in the county. Furthermore, by 1930 nearly all American chestnut trees in Washington County were killed by chestnut blight. New forests began to develop in response to these events. Pioneer tree species started to cover abandoned agricultural lands. Forests regenerated on cutover or burned lands, and oaks replaced the American chestnut. Most forests in Washington County are 70 to 110 years old.

About 112,000 acres, or 38 percent of the county, is currently in forest. Most of this acreage is privately owned; Federal, State, county, and local municipality ownership's occupy the rest. Some of the larger public forest lands include the C&O Canal National Historical Park, Indian Springs and Sideling Hill Wildlife Management Areas, South Mountain Natural Environmental Area, and the Hagerstown Watershed.

Most forestland is in the Blue Ridge province and in the western part of the Ridge and Valley province. In the Blue Ridge province, chestnut oak and scarlet oak are found on ridges and upper slopes; red, white, black, and chestnut oaks, hickory, ash, red maple, and yellow-poplar are the most common species on the upper slopes to the foot slopes. Associated species include black birch, American beech, black gum, and scattered white pine and Virginia pine. On South Mountain Dekalb soils are on summits, Dekalb and Bagtown soils are on upper and middle backslopes, Thurmont and Trego soils are on lower foot slopes, and Weverton soils are on midslopes and footslopes.

Generally, these soils are too steep, too stony, and low in natural fertility for producing agricultural crops and for carrying out most agricultural practices. The Ridge and Valley province, from Fairview Mountain west, is also dominated by the oak-hickory type. Chestnut and scarlet oaks are the most common species on the dry, shallow soils on ridges, such as Dekalb soils on the sandstone members and Berks, Calvin, Klinesville, and Weikert soils on the shale members.

Red oak, white oak, black oak, chestnut, hickory, blackgum, red maple, and black birch are on back slopes and foot slopes. Soils on these landscapes are Buchanan, Hazleton, Pecktonville, and Sideling soils. Like the soils in the Blue Ridge province, the slope, stoniness, and low fertility of these soils are severe limitations for most agricultural uses. The best use of the soils in these areas is forest production.

In the fertile limestone valley, scattered forests are generally associated with areas of limestone outcrops. These forests consist of various tree species, including white ash, elm, black walnut, yellow-poplar, hackberry, red oak, white oak, black oak, chinquapin oak, hickory, red maple, and eastern redcedar. The soils in the limestone valley are well suited to the production of agricultural crops. The soils there have been cleared of trees and are used for farming.

Many factors influence the health and composition of both present and future forests. At present, some of the more obvious threats to the forests include an increasing population, development, improper forest management, introduced or invasive plants, insects and diseases, and deer browsing. Gypsy moth and oak decline, depending on the degree of mortality, will likely continue to be problems in oak-dominated forests, eventually creating different structural and compositional changes within the forests. Dutch elm disease and elm yellows are killing many elms in Washington County. Tree of heaven continues to prevent the regeneration of valuable native species.

The tables in this section can help forest owners or managers plan the use of soils for wood crops. They show the potential productivity of the soils for wood crops and rate the soils according to the limitations that affect various aspects of forest management.

Forest Productivity

In table 11, the *potential productivity* of merchantable or *common trees* on a soil is expressed as a site index and as a volume number (USDA, FS, 1976). The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that forest managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. More detailed information regarding site index is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet (USDA, NRCS, National forestry manual).

The *volume of wood fiber*, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Trees to manage are those that are preferred for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

Forest Management

In tables 12a through 12d, interpretive ratings are given for various aspects of forest management. The ratings are both verbal and numerical.

Some rating class terms indicate the degree to which the soils are suited to a specified forest management practice. *Well suited* indicates that the soil has features that are favorable for the specified practice and has no limitations. Good performance can be expected, and little or no maintenance is needed. *Moderately well suited* indicates that the soil has features that are moderately favorable for the specified practice. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. *Poorly suited* indicates that the soil has one or more properties that are unfavorable for the specified practice. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. *Unsuited* indicates that the expected performance of the soil is unacceptable for the specified practice or that extreme measures are needed to overcome the undesirable soil properties.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified forest management practice (1.00) and the point at which the soil feature is not a limitation (0.00).

Rating class terms for fire damage and seedling mortality are expressed as *low, moderate,* and *high.* Where these terms are used, the numerical ratings indicate gradations between the point at which the potential for fire damage or seedling mortality is highest (1.00) and the point at which the potential is lowest (0.00).

The paragraphs that follow indicate the soil properties considered in rating the soils for forest management practices. More detailed information about the criteria used in the ratings is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet (USDA, NRCS, National forestry manual).

For *limitations affecting construction of haul roads and log landings*, the ratings are based on slope; flooding; plasticity index, e.g., stickiness; the hazard of soil slippage; content of sand; the Unified classification, e.g., strength; rock fragments on or below the surface; depth to a restrictive layer that is indurated; depth to a water table; and ponding. The limitations are described as slight, moderate, or severe. A rating of *slight* indicates that no significant limitations affect construction activities, *moderate* indicates that one or more limitations can cause some difficulty in construction, and *severe* indicates that one or more limitations can make construction very difficult or very costly.

The ratings of *suitability for log landings* are based on slope; rock fragments on the surface; plasticity index, e.g., stickiness; content of sand; the Unified classification, e.g., strength; depth to a water table; ponding; flooding; and the hazard of soil slippage. The soils are described as well suited, moderately suited, or poorly suited to use as log landings.

Ratings in the column *soil rutting hazard* are based on depth to a water table; rock fragments on or below the surface; the Unified classification, e.g., strength; depth to a restrictive layer; and slope. Ruts form as a result of the operation of forest equipment. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that the soil is subject to little or no rutting, *moderate* indicates that rutting is likely, and *severe* indicates that ruts form readily.

Ratings in the column *hazard of offroad or offtrail erosion* are based on slope and on soil erodibility factor K. The soil loss is caused by sheet or rill erosion in offroad or offtrail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of *slight* indicates that erosion is unlikely under ordinary climatic conditions; *moderate* indicates that some erosion is likely and that erosion-control measures may be needed; *severe* indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and *very severe* indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Ratings in the column *hazard of erosion on roads and trails* are based on the soil erodibility factor K, slope, and content of rock fragments. The ratings apply to unsurfaced roads and trails. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that little or no erosion is likely; *moderate* indicates that some erosion is likely, that the roads or trails may require occasional maintenance; and that simple erosion-control measures are needed; and *severe* indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Ratings in the column *suitability for roads (natural surface)* are based on slope; rock fragments on the surface; plasticity index, e.g., stickiness; content of sand; the Unified classification, e.g., strength; depth to a water table; ponding; flooding; and the hazard of soil slippage. The ratings indicate the suitability for using the natural surface of the soil for roads. The soils are described as well suited, moderately well suited, or poorly suited to this use.

Ratings in the columns *suitability for hand planting* and *suitability for mechanical planting* are based on slope; depth to a restrictive layer; content of sand; plasticity index, e.g., stickiness; rock fragments on or below the surface; depth to a water table; and ponding. The soils are described as well suited, moderately well suited, poorly suited, or unsuited to these methods of planting. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column *suitability for use of harvesting equipment* are based on slope; rock fragments on the surface; plasticity index, e.g., stickiness; content of sand; the Unified classification, e.g., strength; depth to a water table; and ponding. The soils are described as well suited, moderately well suited, or poorly suited to this use.

Ratings in the column *suitability for mechanical site preparation (surface)* are based on slope; depth to a restrictive layer; plasticity index, e.g., stickiness; rock fragments on or below the surface; depth to a water table; and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 1 foot is considered in the ratings.

Ratings in the column *suitability for mechanical site preparation (deep)* are based on slope, depth to a restrictive layer, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 3 feet is considered in the ratings.

Ratings in the column *potential for seedling mortality* are based on flooding, ponding, depth to a water table, content of lime, reaction, salinity, available water capacity, soil moisture regime, soil temperature regime, aspect, and slope. The soils are described as having a low, moderate, or high potential for seedling mortality.

Recreation

John Gudmunson, assistant planner, Washington County Planning Department, helped to prepare this section.

Washington County provides opportunities for a great variety of recreational activities. These activities attract thousands of tourists and residents each year and provide an important source of revenue for the county. Hunting, fishing, hiking, canoeing, biking, boating, and horseback riding are major activities. Numerous public woodlots, the South Mountain Recreational Area, the Indian Springs Wildlife Area, the Sideling Hill Management Area, and the recently acquired Woodmont Hunt Club Area provide excellent opportunities for hunting, hiking, and nature study. The Maryland Department of Natural Resources manages about 21,000 acres of public woodlands and parkland.

The best soils in the county for most recreation uses are deep, well drained soils that have few or no stones on the surfaces. The soils on and near the major ridges, such as South Mountain and Sideling Hill, have an extremely stony surface that is severely limited for intensive recreation uses. However, these soils have potential for recreation uses that require only slight land alteration, for example, hiking trails similar to the Appalachian Trail. The soils that have the poorest potential for recreation use are poorly drained and very poorly drained soils and steep and very steep soils.

The soils of the survey area are rated in tables 13a and 13b according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in tables 13a and 13b can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas.

The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Offroad motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Wildlife Habitat

Andy Smoger, project forester, Maryland Department of Natural Resources, helped to prepare this section.

The principal game species in Washington County are whitetailed deer, squirrel, cottontail rabbit, quail, pheasant, and wild turkey. The more abundant furbearers are beaver, mink, muskrat, raccoon, and fox. A large variety of nongame songbirds, reptiles, amphibians, and small mammals inhabit the county.

The occurrence and abundance of wildlife species are related to land use, which in turn is closely correlated to soil patterns. The soils influence land use and differ in their suitability for growing plants that furnish food and cover for wildlife. Wildlife favors soils capable of producing a good growth of plants. Other factors, such as availability of water, climate, predators, disease, and human activities, are also important. They help determine whether a particular species of wildlife can survive or thrive in particular area.

Whitetailed deer inhabit most areas of the county, but especially woodland that has a mixture of brush or young trees, a few mature trees, and some small, open areas. Many deer seek protection of the forest, but prefer to feed on farm crops. The largest concentration of whitetailed deer is generally along the base of South Mountain, Elk Ridge, Fairview Mountain, and Bearpond Mountain.

Dove and cottontail rabbit are plentiful in areas that have been farmed. Abandoned farmland that is overgrown by brush generally has a large population of cottontail rabbit. Gray squirrel and wild turkey prefer the mature oak-hickory forest, which provides a plentiful source of food. Raccoon, opossum, groundhog, skunk, and fox are generally well distributed throughout the county. Beaver, mink, and muskrat live along streams and ponds on bottomland.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 14, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, orchardgrass, bluegrass, ryegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, purpletop, broomsedge, deertongue, goldenrod, aster, ragweed, dock, and chickweed.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, hawthorn, dogwood, hickory, witch-hazel, spicebush, and blueberry.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Shrubs are multistemmed woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, and soil moisture. Examples of shrubs are elderberry, silky dogwood, blackberry, arrowwood, alder, and various willows.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, ironweed, joe-pye weed, rice cutgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, other types of natural wetlands, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous trees, coniferous trees, or both, and associated herbaceous understory plants and shrubs. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas and wooded wetlands. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Hydric Soils

In this section, hydric soils are defined and described and the hydric soils in the survey area are listed.

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for each of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 1995). These criteria are used to identify a phase of a soil series that normally is associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 1998) and in the "Soil Survey Manual" (Soil Survey Staff, 1993).

If soils are wet enough for a long enough period to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils in this survey area are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and others, 1996).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

Table 15 gives the map units that meet the definition of hydric soils and that have at least one of the hydric soil indicators. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; Hurt and others, 1996).

Map units that are made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified (USDA, NRCS, National engineering handbook). Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Tables 16a and 16b show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Sanitary Facilities

Tables 17a and 17b show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Agricultural Waste Management

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

Tables 18a and 18b show the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of these tables, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the tables are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops (application of manure and food-processing waste, application of sewage sludge, and disposal of wastewater by irrigation) and for waste management systems that are designed only for the purpose of wastewater disposal and treatment (overland flow of wastewater, rapid infiltration of wastewater, and slow rate treatment of wastewater).

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are generally favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Application of manure and food-processing waste not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are either solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Application of sewage sludge not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

Overland flow of wastewater is a process in which wastewater is applied to the upper reaches of sloped land and allowed to flow across vegetated surfaces, sometimes called terraces, to runoff-collection ditches. The length of the run generally is 150 to 300 feet. The application rate ranges from 2.5 to 16.0 inches per week. It commonly exceeds the rate needed for irrigation of cropland. The wastewater leaves solids and nutrients on the vegetated surfaces as it flows downslope in a thin film. Most of the water reaches the collection ditch, some is lost through evapotranspiration, and a small amount may percolate to the ground water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, and the design and construction of the system. Reaction and the cation-exchange capacity affect absorption. Reaction, salinity, and the sodium adsorption ratio affect plant growth and microbial activity. Slope, permeability, depth to a water table, ponding, flooding, depth to bedrock or a cemented pan, stones, and cobbles affect design and construction. Permanently frozen soils are unsuitable for waste treatment.

Rapid infiltration of wastewater is a process in which wastewater applied in a level basin at a rate of 4 to 120 inches per week percolates through the soil. The wastewater may eventually reach the ground water. The application rate commonly exceeds the rate needed for irrigation of cropland. Vegetation is not a necessary part of the treatment; hence, the basins may or may not be vegetated. The thickness of the soil material needed for proper treatment of the wastewater is more than 72 inches. As a result, geologic and hydrologic investigation is needed to ensure proper design and performance and to determine the risk of ground-water pollution.

The ratings in the table are based on the soil properties that affect the risk of pollution and the design, construction, and performance of the system. Depth to a water table, ponding, flooding, and depth to bedrock or a cemented pan affect the risk of pollution and the design and construction of the system. Slope, stones, and cobbles also affect design and construction. Permeability and reaction affect performance. Permanently frozen soils are unsuitable for waste treatment.

Slow rate treatment of wastewater is a process in which wastewater is applied to land at a rate normally between 0.5 inch and 4.0 inches per week. The application rate commonly exceeds the rate needed for irrigation of cropland. The applied wastewater is treated as it moves through the soil. Much of the treated water may percolate to the ground water, and some enters the atmosphere through evapotranspiration. The applied water generally is not allowed to run off the surface. Waterlogging is prevented either through control of the application rate or through the use of tile drains, or both.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, and the application of waste. The properties that affect absorption include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, depth to bedrock or a cemented pan, reaction, the cation-exchange capacity, and slope. Reaction, the sodium adsorption ratio, salinity, and bulk density affect plant growth and microbial activity. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Construction Materials

Tables 19a and 19b give information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

The soils are rated *good, fair,* or *poor* as potential sources of topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

The soils are rated as a *probable* or *improbable* source of sand and gravel. A rating of *probable* means that the source material is likely to be in or below the soil. The numerical ratings in these columns indicate the degree of probability. The number 0.00 indicates that the soil is an improbable source. A number between 0.00 and 1.00 indicates the degree to which the soil is a probable source of sand or gravel.

Gravel and *sand* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 19a, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the lowest layer of the soil contains sand or gravel, the soil is rated as a probable source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Water Management

Table 20 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils (USDA, NRCS, 1996). Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics. These results are reported in table 21.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Index Properties

Table 21 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

USDA texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 21.

Fragments are rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Properties

Table 22 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller. Sand and silt are not included on the table.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 22, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 deg C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in inches per hour (in/hr), when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 22, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in table 22 as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility group refers to groups of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

Table 23 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Water Features

Table 24 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil group refers to groups based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

The *month* in the table indicates the part of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 24 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 24 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides (fig. 21). Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering

Figure 21.—Typical flood plain along the Potomac River near Williamsport. Debris on the telephone pole indicates that, during past flooding, the water level reached about 15 feet above normal.

surveys that delineate flood-prone areas at specific flood frequency levels.

Soil Features

Table 25 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial cone. The material washed down the sides of mountains and hills by ephemeral streams and deposited at the mouth of gorges in the form of a moderately steep, conical mass descending equally in all directions from the point of issue.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as:

Very low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	more than 5.2

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Congeliturbate. Soil material disturbed by frost action.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Desert pavement. On a desert surface, a layer of gravel or larger fragments that was emplaced by upward movement of the underlying sediments or that remains after finer particles have been removed by running water or the wind.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head out. To form a flower head.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees thus forming numerous depressions or small basins.

Knoll. A small, low, rounded hill rising above adjacent landforms.

K Saturated hydraulic conductivity. (See Permeability.)

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The deg of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Level	0 to 3 percent
Very gently sloping	3 to 8 percent
Gently sloping	8 to 15 percent
Moderately sloping	15 to 25 percent
Strongly sloping	25 to 45 percent
Moderately steep	45 to 65 percent

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to Ca^{++} + Mg^{++}. The deg of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Talus. Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

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